

**AQUATIC CODING GUIDELINE OUTLINE****1. Quality Assurance Parameters**

QA Date/Initials  
Publication Reference Number, Author, Year  
Total Tests  
Reviewer/Date

**2. Test Chemical Parameters**

Chemical Name (TEST)  
Chemical Grade (GRADE)  
Chemical Characteristics (CHARACTERISTICS)  
Radiolabel  
Chemical Abstract Services Registry Number (CAS#)  
Solvent Chemical (S/V)  
Other Chemicals (OTH CHEM)

**3. Test Organism Parameters**

Species  
Organism Characteristics  
Control

**4. Test Condition Parameters**

Test Media (FW/SW)  
Test Location (LAB, NR, FIELDN, FIELDA, FIELDU)  
Study Type  
Experimental Design

**5. Test Result Parameters**

<u>Endpoint (ENDPT)</u>	<u>Effect Percent (EFCT % )</u>
ENDPOINT HIERARCHY	<i>Combining Effect Percent</i>
<u>Trend</u>	<u>Statistical Significance (SIGNIF)</u>
<u>Effect</u>	<i>Combining of Statistics</i>
<i>Combining Effect</i>	<u>Significance Level (LEVEL)</u>
EFFECT HIERARCHY	<i>Combining of Level</i>
<u>Tissue</u>	<u>Other Effects (OTH EFFECT)</u>
<i>Combining Tissue</i>	<u>Test Result Examples</u>
<u>EE_Remark</u>	

**6. Concentration Parameters**

Concentration Type (CONC TYPE)  
    *Concentration Types and Definitions*  
Effect Concentration (CONC)  
Bioconcentration Value (BCF)

Chemical Analysis Method  
Exposure Type

**7. Test Duration Parameters**

Exposure Time

**8. Water Chemistry Parameters**

Specific Parameters

**9. Remark Parameters****10. Field Testing Parameters**

Habitat Description (HAB)  
Substrate (SUBSTR)  
Water Depth (DEPTH)  
Location  
Geographic Text(ST/PR/COUNTRY)  
Latitude/Longitude (LAT/LONG)

Application Type (AP TYPE)  
Application Frequency (AP FREQ)  
Application Rate (AP RATE)  
Chemical Half-life (HALF LIFE)  
Application Season (AP SEAS)  
Application Date (AP DATE)

**KEYWORD INDEX TO CODING GUIDELINES**  
**GLOSSARY**  
**REFERENCES**

## **A OVERVIEW OF ECOTOX**

### **1. Introduction to Review of Literature**

The data elements included in ECOTOX encompass standard test parameters typically reported within a publication. Each database record contains information about the exposure and test conditions. Specific parameters include the test chemical, species, and endpoint or effect concentration.

The included literature is identified through standardized bibliographic retrievals. Each publication is evaluated and the applicable data is encoded by trained literature reviewers. The data encoded are evaluated according to existing standard test methods such as those from the American Society for Testing and Materials (1993), Code of Federal Regulations (1992), and the American Public Health Association (1992). Each test included in ECOTOX is assigned a documentation code that indicates the amount of supporting methods and results documentation available in the original scientific publication.

### **2. Literature Reviewer Training**

#### Training Sequence

The training sequence is designed to develop consistent, accurate, and versatile literature reviewers. This is accomplished through an intensive period of literature review, interactive quality assurance procedures, and consultation with other ECOTOX database personnel.

The scope of the six month intensive training period encompasses the following areas:

- endpoint toxicity test review (one month);
- effect only toxicity test review (two months);
- bioconcentration study review (one month);
- field study review (one month); and
- in-depth training within the areas listed above (one month).

The personnel available to support the reviewer include the data coordinator and trained ECOTOX reviewers. The following documentation and materials are used for training:

ECOTOX Standard Operating Procedures (1998, US EPA Contract GS04K95BFD0169, Task #CCA686461;

- Fundamentals of Aquatic Toxicology (Rand (Ed) 1995);
- American Society for Testing and Methods; (ASTM, 1996)
- Selected toxicity literature publications; and
- AQUIRE and TERRETOX coding sheets.

The reviewer initially reviews the ECOTOX Standard Operating Procedures: Coding Guidelines, applicable publications listed in the reference section for each of the databases, applicable US EPA Standard Evaluation Procedures and ASTM guidelines. The primary emphasis is to understand the minimum criteria that characterize toxicity tests. These criteria must be reported in the toxicity publications selected for review in order to qualify for

inclusion in the ECOTOX database. The criteria are:

- Name of the test **chemical**;
- Name of the **test organism**;
- **Effect** of the test chemical on the organism;
- Test chemical **concentration** or application rate;
- Test **duration** (except for abstracts and non-English publications).

The secondary emphasis is to develop the ability to distinguish between exposure types (lethal, sublethal, bioconcentration). The reviewer is trained to recognize whether standard methods are reported for test methodologies and for the test endpoint. The reviewer is also trained to identify tests which are not applicable to ECOTOX.

Once the general introductory materials are read, the standard training guidelines introduce the reviewer to each category of toxicity literature. Information specific to areas of acute, chronic and bioconcentration literature is discussed in subsequent sections of this chapter. The guidelines can be tailored to the specific areas of expertise and strengths that each person brings to the project. Three primary elements are emphasized in each component of the training sequence. The standard training sequence is:

1. Example review: Examination of previously encoded toxicity literature. The trainee reviews between 5 to 10 toxicity publications and compares each with its associated pre-completed coding sheet.
2. Independent review: The trainee independently reviews a minimum of 10 to 20 toxicity publications. All 10 - 20 reviews are quality assured via a review of the publication and coding by the data coordinator. Inconsistent coding practices are resolved with the trainee. The trainee continues to review additional toxicity publications and the level of QA decreases from 100 percent to 10 percent as the reviewer's consistency and proficiency increase.
3. Measure of proficiency: Established ECOTOX quality assurance procedures require a close review of all reviewed publications by the data coordinator to ensure accurate reviewing is consistent with current test methodologies and SOPs. All discrepancies identified are noted by the data coordinator and discussed with the trainee.
4. A full time reviewer begins the training sequence reviewing 20 publications per month. This amount increases until a level of 35 publications per month is attained. The average time estimated per review at the beginning of the training sequence is 1.5 hours per publication. The time should decrease to one hour per publication. A part time reviewer's training expectations will be decreased accordingly.

### Measures of Competency for Trained Reviewers

The quality assurance process is an ongoing component of literature reviewing. Emphasis is placed on quality assurance during the initial collaborative training period, during the 10 percent replicate review process, and through consultation with publications in the field of aquatic toxicology. As part of this process, consistency and concurrence between the document abstractors is attained.

The ten percent replicate review process assures data integrity and promotes routine evaluation of coding practices. Through this training process, strengths and weaknesses in the data abstractor's expertise are identified and specific programs are established to enhance expertise where needed. Such programs include consultation with ECOTOX staff, toxicology publications and the EPA Database Manager, as needed. Evaluation of replicate reviews, which is performed on 10% of all coded references, is used to flag and correct any major discrepancies between replicates. In addition a screening of all completed coding sheets to ensure consistency and completeness prior to data entry is required. Parameters routinely screened include water chemistry, test organism descriptors, calculated endpoints and total test numbers.

### Steps in the Quality Assurance Process

1. Ten percent of the reviewed articles from each abstractor are randomly identified by the data coordinator. Information concerning the number of publications is entered into a Lotus 1-2-3 file, maintained on the data coordinator's computer. The spreadsheet tracks the QA process and calculates the percent of the publications subjected to quality assurance for each reviewer (Table 1). The original reviewer's code sheet for the chosen publication is placed in the "Double Review and QA" file folder maintained by the data coordinator. An "ECOTOX 10% Tracking Form" sheet is maintained in the folder and filled out as articles are received (Figure 1). The spreadsheet file is also updated.

**Table 1. ECOTOX 10% TRACKING SHEET EXAMPLE**

Date Rec	Doc #	Tot Rec'd	# QAed	2nd Rev	2nd Comp	Coord	Completed
11/30/93	5342	8	1	JACKY	11/30/93	ANNE	01/15/94
12/14/93	6808	10	1	AMY			

2. The publication is given to a second reviewer for independent review. After completion of the second review, the data coordinator gives the coding sheets and paper to the EPA Database Manager who compares both reviewer's coding sheets, documents the differences (if any) between reviewers, archives the information on the "ECOTOX 10% Replicate Review" form (Figure 1), then returns the form to the reviewers for comment. The reviewers note discrepancies by either agreeing with the EPA Database Manager's comments or expressing their differing opinions on the form. After the replicate review form

is returned to the EPA Database Manager, discussions are held with both reviewers to resolve any remaining differences. Discrepancies due to differences in interpretation are resolved by the EPA Database Manager. Errors caused by incomplete Coding Guideline documentation are identified and modifications are made to the document.

3. Upon completion of the review process, the data coordinator checks to make sure the original reviewer's coding sheet contains the correct data, notes completion date on the "ECOTOX 10% Tracking Form" and in the spreadsheet, and forwards the coding sheet to data entry. The ECOTOX 10% Replicate Review forms are filed with the double review coding sheets in a separate file.

Figure 1. ECOTOX Replicate Review Form

<b>ECOTOX 10% REPLICATE REVIEW</b>	
<div style="border: 1px solid black; padding: 5px; display: inline-block;"><input type="checkbox"/></div> <div style="margin-left: 10px;">Replicate Review Complete</div>	<div>Date: _____</div> <div>Reference Number: _____</div>
<b>Section I</b> Coordinator Comments (Data abstraction discrepancies outlined):    <div style="text-align: right; margin-top: 20px;">Initials: _____ Date: _____</div> <div style="border-top: 1px dashed black; height: 1px; margin-top: 10px;"></div>	
<b>Section II</b> Second Data Abstractor Comments (Response to discrepancies):    <div style="text-align: right; margin-top: 20px;">Initials: _____ Date: _____</div> <div style="border-top: 1px dashed black; height: 1px; margin-top: 10px;"></div>	
<b>Section III</b> First Data Abstractor Comments (Response/Incorporation of modifications):    <div style="text-align: right; margin-top: 20px;">Initials: _____ Date: _____</div> <div style="border-top: 1px dashed black; height: 1px; margin-top: 10px;"></div>	
<b>Section IV</b> <i>(If non-applicable, go to Section VI)</i> Coordinator Comments (Remaining data abstraction discrepancies outlined):    <div style="text-align: right; margin-top: 20px;">Initials: _____ Date: _____</div>	
<div>[ ] Further action required, see below:</div>	

Initials: \_\_\_\_\_ Date: \_\_\_\_\_

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**Section V** (*If Section IV is used, complete Section V*)

First Data Abstractor Comments (Response/Incorporated modifications outlined):

Initials: \_\_\_\_\_ Date: \_\_\_\_\_

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**Section VI**☐ Replicate review complete; no further action required.

Initials: \_\_\_\_\_ Date: \_\_\_\_\_

### 3. General Coding Information

#### Overview

ECOTOX is comprised of three databases - AQUIRE, PHYTOTOX and TERRETOX. Across the three databases, the common data elements for each test contained in ECOTOX are grouped by chemical, organism, exposure conditions, and effects. Test chemical parameters describe the toxicant and any associated carrier; the CAS registry number; and the grade, purity and/or composition. The test organism parameters include the Latin name, a species number and lifestage, source, and/or characteristics of the organism. The test conditions identify the test location; exposure type, time, and conditions; and any control parameters. Effect and endpoint parameters consist of codes to define lethal, sublethal, or residue effects and/or endpoints. The corresponding chemical concentration or dose is reported for both exposure and observation concentrations, if reported. Available data are extracted from the text, tables, and graphs of each publication.

Based on the information coded for the preceding categories, a documentation code is calculated for each piece of data in ECOTOX. The documentation code provides an index of the completeness of methods documentation and results presentation in the original publication.

The following sections are designed as an overview of the guidelines for reviewers. The information presented in this section identifies the common and unique attributes of each database. Each section heading corresponds to a data element (if the data element is unique to one or two of the databases, this is noted following the section heading). The unique attributes of each database are described in the specific coding guidelines located in Section C for AQUIRE, Section D for PHYTOTOX, and Section E for TERRETOX. Any exceptions from these guidelines must be authorized by the EPA Database Manager and subsequently documented in these guidelines.

#### Coding Practices

This section provides an overview of the general coding practices used for the ECOTOX database. These practices have been devised to ensure accuracy and consistency in transcribing data from the original publication to the final data file.

- A unique coding sheet is used for each of the independent databases - AQUIRE, PHYTOTOX and TERRETOX. Guidelines for coding data as well as blank copies of the coding sheets can be found in Section C for AQUIRE, Section D for PHYTOTOX, and Section E for TERRETOX.
- Each reported test exposure (or in some cases each unique endpoint) requires a separate line on the coding sheet. If many tests are reported that are conducted under similar conditions, ditto marks are placed in the field or remarks area where the information is identical to the line above.
- Endpoints, effect or exposure concentrations/doses, control data and exposure times reported in graphic format are coded. Data extracted from graphs are presented as range or <, > values, unless an exact value is clearly presented. If the format of the graph does not allow extrapolation, the availability of such data is noted in REMARKS, i.e., "/control data graphed/". Data extracted from a graph must be accompanied by a comment in the REMARK field "/from

graph//". When there is a discrepancy between data presented in the text or table and data presented in a graph, the paper is to be forwarded to the EPA Database Manager for a final determination of which data point will be included in the database.

- To ensure completeness and accuracy, if information is unavailable for a coding field, the field must still be completed using either NR (not reported) or occasionally, NA (not applicable).
- To ensure accuracy in transcribing data values, all numbers between zero and one should be reported with a zero preceding the decimal point (e.g., 0.5 not .5). Periods are only used to represent a decimal point, never an abbreviation.
- To ensure consistency as well as accuracy, report the significant figures as the author reports them. Do not add or round off numbers. Report only the actual values, do not code variance information (e.g. +/-).
- Use "per" or a colon (:) instead of a slash (/) to designate ratios. Reserve the slash for designating remarks or units.
- The REMARK field is a text field which contains additional information about a coding field. The Remark field is used when the information necessary for coding a field does not fit in the space provided. A complete list of remark identifiers is documented in the appendices for each of the databases.

## C. ACQUIRE CODING GUIDELINES

A unique coding sheet is used for each of the independent databases - copies of the ACQUIRE coding sheets are located in Appendix A. For ACQUIRE, field (natural and artificial) tests are coded on the ACQUIRE Field Coding Sheet; all other studies are coded on the ACQUIRE Lab Coding Sheet.

### 1. Quality Assurance Parameters

#### QA Date/Initials

The person conducting the first Quality Assurance Check enters the date of the QA check and their initials.

#### Publication Reference Number, Author, Year

The Reference Number (Ref #) is the unique number which identifies a particular publication. This number, assigned by the data entry program, provides the link between the data entered and the original publication. On the coding sheet, enter the reference number located in the upper right-hand corner of the hard copy of the publication, the last name of the first author, and the publication year. For abstracts, use the publication year of the abstract source.

#### Total Tests

The total tests encoded for a publication are recorded by the reviewer. The total test number equals the total number of individual effect records that are coded for each publication.

#### Reviewer/Date

The reviewer's last name is written here. The date on which the publication was reviewed should be entered in the format of month/day/year.

### 2. Test Chemical Parameters

ACQUIRE is catalogued by the toxicant tested using the Chemical Abstracts Service (CAS) registry number. If a CAS registry number is not available through standard sources the toxicity data cannot be included in ACQUIRE. Additional toxicants not included in ACQUIRE are water chemistry effects (e.g., pH), complex effluents, and chemical mixtures.

Chemical mixtures may be interpreted broadly. For example, if a pesticide is a mixture of two active ingredients, each may have a separate CAS number. If the formulation has a CAS number, the chemical reported for ACQUIRE is the formulation. If the exposure is based on two metal compounds but the effect is based on one ion, e.g., copper sulfate and copper chloride and Cu is the toxicant, code copper as the test chemical and report the two compounds in chemical characteristics.

For in situ exposures where the exposure is by default an exposure to a chemical mixture; code residue effects or endpoints (BCF) only. No other effects or endpoints are strictly attributable to a single chemical in the same way as a residue concentration.

Nutrients such as phosphorus, nitrogen, potassium are coded for ACQUIRE if the exposure system is dosed rather than an ambient exposure. For example, code phosphorus as an exposure chemical if, in the given paper, all of the following are true:

- The phosphorus was added to the ecosystem in a direct discrete manner, i.e., code *"nylon mesh bags of Ca(H<sub>2</sub>PO<sub>4</sub>)<sub>2</sub> placed in streams at beginning of test"*, do not code *"system may have received added phosphorus in overland runoff due to fertilizers used in nearby agricultural operations"*. Aerial applications are acceptable if the other conditions are met.
- The concentration in the water should be measured, or at a minimum, the application rate should be available. Application rate may be calculated using the flow volume and the phosphorus-containing compound's dissolution rate.
- The effects of the phosphorus are tested on a biological test organism; water quality or chemical-fate only papers are not coded.

#### Chemical Name (Test)

Record the chemical name as it is reported in the publication; however, long chemical formulas or names need not be coded if a common name is provided. For common names, record common name in both the Chemical Name field and the Chemical Characteristics field; when the CAS number is entered into the system the 9CI Preferred Name will be assigned automatically. The Chemical Name field on the coding sheet is used for the convenience of the encoder in assigning the CAS number. If several names (e.g., trade names, synonyms) are used, note the other names and formula in parenthesis after the recorded chemical name.

The CAS number is assigned by locating the chemical name in the chemical card file. If the chemical name is not in the chemical card file, write "No" near the CAS # field to clearly identify that verification is needed. The coding sheet will be referred to ECOTOX staff for CAS number verification as part of the quality assurance process.

#### Chemical Grade (Grade)

Record relevant chemical grade information (refer to Appendix B1).

#### Chemical Characteristics (Characteristics)

Record relevant and specific chemical information, such as trade names, common names, isomers, percent purity or active ingredient (refer to Appendix B2). There are times when you will record the chemical name in both the Chemical Name field and the Chemical Characteristics field. This occurs most frequently for pesticides where the common or trade name is very simple while the chemical nomenclature is very complex. The purpose, during reviewing, for the name in Chemical Name field is to assist the reviewer in assigning a CAS number; during data entry the name is replaced by a stored 9CI Preferred Name. The common name coded in Chemical Characteristics remains available for user access.

#### Radiolabel

If a radiolabeled chemical is tested, record the isotope, according to the Appendix C codes, in the radiolabel field. When the specific isotope is not reported, the field should be coded with a slash ("/") and noted in the Remark field (RADIO/no isotope reported//). When both radiolabeled and unlabeled test chemicals are used in a test, report the radiolabel isotope and code "labeled and unlabeled" in chemical characteristics.

#### Chemical Abstracts Services Registry Number (CAS #)

A standardized identification number and name for each chemical recorded in the database

is used for consistency. Toxicants included in the AQUIRE database are assigned a CAS registry number and are referred to by the Ninth Collective Index (9CI) standard nomenclature. The CAS number and 9CI name are stored in a chemical card file and in an online index file (CHEMNAME) which is available electronically for screening CAS numbers and chemical names used in AQUIRE. Chemical name synonyms are not stored electronically, but are only available from the chemical card file.

#### Solvent Chemical (S/V)

If a carrier or solvent is used, the name of the chemical is reported. If a solvent carrier is used in the test, the solvent chemical fields are coded with the chemical name, grade, purity, concentration (in Chemical Characteristics) and CAS number. The CAS numbers for common carriers are listed in Appendix D.

Occasionally two separate carriers or solvents are used. If the publication reports the ratio, include this information in the Characteristics field. If the carrier or solvent is for different chemicals but the use is not specifically described in the publication, code "as needed" in the Characteristics field.

If a carrier was not used, report as NR. Buffers used to control the pH of the test are not coded. Dietary feed content is not coded.

#### Other Chemicals (OTHER CHEM)

Chemicals or groups of chemicals that were tested jointly with the test chemical are reported in this field. Chemical symbol, formula or common chemical name acronym are acceptable text formats; separate each chemical name, symbol, or formula by commas. Additionally, code in the Other Effect field as "mixture".

Other Chem: Cu, Hg, Endosulfan, TBT//  
Other Efct: mixture//

Additional chemicals reported in the publication but for which you are unable to code data, e.g., effluents or chemicals which do not have CAS #s, are noted in Other Effects rather than in Other Chemicals.

### **3. Test Organism Parameters**

#### Species

Each test organism is identified by the current Latin name as verified in the taxonomic literature. For each species entry, the verified name, taxonomic code, nomenclature history, and verification sources are kept on file for quality assurance documentation purposes. A unique number is assigned to each ECOTOX species to aid in storage and retrieval. The species number may be located via two separate online files (SLATIN for Latin names and SCOMMON for common names). A hard copy of the SLATIN file is available from the species verification staff. Refer to Section 7. SPECIES PROCEDURES for additional information about the species data file and verification procedures.

Field studies may report results for a target community (e.g. benthic macroinvertebrates) or for an entire enclosed ecosystem (e.g. system-level primary productivity or respiration). If a community of organisms was tested, be as specific as the author is about the species grouping. Family and order names may be located from SLATIN and SCOMMON as

described above.

If the species name reported in the publication is a synonym of a verified species, record the name from the publication, draw a line through it and record the verified species name along with the species number. If the species is not on the verified name list, write "No" near the Latin name to clearly identify that verification is needed. The coding sheet will be referred to ECOTOX staff for species verification as part of the quality assurance process

### Organism Characteristics

Report any general information provided about the test organism. Organism characteristics include information such as age, weight, length, developmental stage, sex, type of culture (eg., axenic) and/or initial cell concentration (e.g. 1 E + 3 cells/ml or expo gro phase or log gro phase) to describe the organism being tested. The value and range, if reported, are recorded for each available parameter (e.g. 3 (2-4) g). Record strains, hybrids or taxonomic groupings, if reported. List individual species latin names when 3 or fewer species are included within a grouping; when more than 3 individual species are included within a grouping, code as "# species".

Species = Plankton (#706)      Org Characteristics = *Daphnia magna*, *Daphnia pulex*, and *Bosmina*  
sp Org Characteristics = 4 zooplankton species

Standard terms used for recording organism length include standard length (SL), (e.g. 3.1 cm SL), total length (TL), fork length (FL), carapace length (CL) and carapace width (CW).

Tests in which eggs are initially exposed, and the exposure continues through adulthood to the first generation, are represented as "egg - adult" or "egg-F1 generation" and effects on the offspring generation (F1) are recorded.

If the paper states that the organisms tested are both male and female, this characteristic does **not** go into the Organism Characteristics field, because a sample assumes both sexes. However, if only one sex is tested, then the sex is coded using the terms "male" or "female".

### Control (Cntl)

The type of test control(s) used in the study is reported in this field. Control information for the reported effect may be presented in the text, in a graph, or in table format. ACQUIRE reviewers do not make assessments whether the controls were satisfactory or insufficient (e.g., were replicates run, did control organisms die), but simply document whether the author(s) present information that a control was used. When author's state that controls were similar to treatment with the exception that no chemical was added, within the same paragraph that they describe using solvent in all treatments, a solvent control should be interpreted. [11/17] Refer to Appendix E for control type codes and definitions.

## **4. Test Condition Parameters**

### Test Media (FW, SW)

Freshwater (FW) tests include 1) laboratory tests conducted in freshwater, reconstituted water, distilled water, or tap water or 2) field tests where the habitat is exclusively freshwater. If a salinity value of <4 ppTh is reported and the paper does not specify whether it is fresh or saltwater, it will be coded as a freshwater test.

Saltwater (SW) tests include 1) laboratory tests conducted in natural or artificial seawater, brackish water, or estuarine water or 2) field tests where the habitat is exclusively saline.

If a determination cannot be made regarding the use of either freshwater or saltwater, an NR (not reported) is recorded.

#### Test Location (Lab, NR, FieldN, FieldA, FieldU)

Report the location or setting in which the experiment was conducted (see Appendix F).

For example, a natural field study (FieldN) is an experiment conducted outdoors in a natural setting in which the test organisms are confined via an enclosure of some type (cage, fencing, plot lines) or sampled in the wild. An important component for classification as natural is that the setting includes a bottom substrate as well as a community of representative organisms. Outdoor studies conducted in a simulated environment are coded as an artificial field study (Field A) study. Such studies include organisms isolated from their natural environment while still out of doors, e.g. earthen or concrete ponds without sediment or with only one representative species.

Laboratory tests are conducted under indoor controlled laboratory conditions. If the location or setting cannot be determined from the publication code as Not Reported (NR). For AQUIRE, field (natural and artificial) tests are coded on the AQUIRE Field Coding Sheet; all other studies are coded on the AQUIRE Lab Coding Sheet.

#### Study Type

For laboratory exposures, the study type is used to identify field simulation studies. For example, indoor mesocosm or microcosm studies should be noted as such in the Study Type field. For field exposures (FIELDN, FIELDA, FIELDU) record the study type as reported by the author. Examples of field study types include, but are not limited to, exposures with caged organisms or conducted in a mesocosm, microcosm or enclosure. If information about the study type is not reported, leave this field blank.

#### Experimental Design

This field is used to code additional study information. For field tests, report exposure system dimensions (e.g. pond or lake depth, cage or enclosure size), type of artificial substrate and physical or chemical water chemistry parameters.

Exp Design: 3 ha polyethylene lined pond//  
Exp Design: sediment//  
Exp Design: Instant Ocean®//

Exp Design: 4 x 4 m cage//  
Exp Design: humic acid//  
Exp Design: Sinking Cr water//

For laboratory studies, information about media and test chambers is coded if one of the purposes of the study is to compare results observed under differing test conditions (e.g., pH, temp, humic acid, sediment) or if commercial media types (e.g. Instant Ocean®) were used in the study. If one of the purposes of the study is to compare experimental effects (pH, temp, sex) in addition to toxicant effects, report the additional effects in the Other Effects field, e.g. Oth Effect: pH efct//.

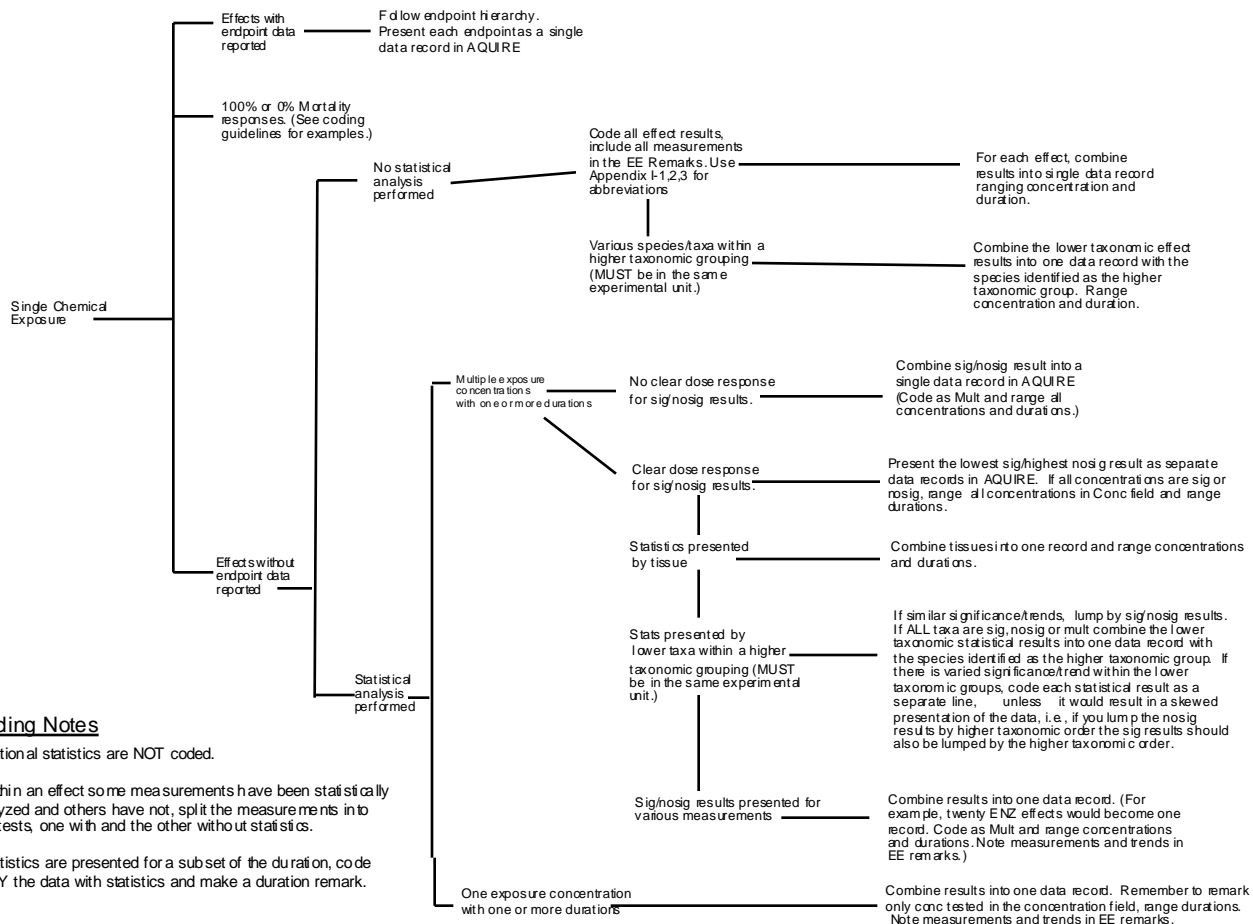
Information about the dilution water is provided if needed to distinguish one test scenario from another, e.g. natural waters from three different ponds, sites on a river, locations in a sea. Tests with differing dilution water are coded as separate lines of data; it is not

acceptable to combine tests by effect or water chemistry variables across differing dilution water test scenarios.

When coding field exposure publications, additional related coding parameters include Study Type, Habitat Code, and Substrate field description; refer to these descriptions while coding Experimental Design parameters.

## 5. Test Result Parameters

Toxicity test results for the AQUIRE database are represented by a combination of the Endpoint, Trend, Effect, Tissue, EE\_Remark, Efct%, Signif, Level, Concentration and BCF fields. Toxicity test results for AQUIRE are primarily reported for observations taken during the chemical exposure; however, when results are reported *only* for the period of time after the exposure, ie. recovery or delayed effects, this type of result is noted by using a "~" in conjunction with the endpoint/effect code, e.g. ~MOR for a delayed mortality effect.



A separate line is coded for each effect or endpoint from either a unique experimental design or within one design scenario for statistically defined effects or endpoints. If no statistics are used to distinguish endpoints or effects and experimental designs are similar the data may be combined into one data record. Endpoints always require a discrete line; effects may be combined based on statistical representation, or lack thereof, by the author. Food chain effects or endpoints are coded for organisms at the first level of exposure. Subsequent levels

of exposure are not coded, but are noted in the Other Effects field, e.g. Oth Effects/food chain study//. See Combining Effects and Statistics sections for further description and examples.

The following sections provide a brief description for each of these fields, followed by guidance for coding information from the publication for each of the fields.

#### Endpoint (Endpt)

For the purposes of AQUIRE, an endpoint is the quantification of an observed effect obtained through statistics or other means of calculation for the express purpose of comparing equivalent effects (e.g., LC50). Appendix G identifies and defines the AQUIRE endpoint codes. The endpoint field will be coded as NR if the author does not report or define an endpoint or there is no companion data point.

Endpoint information is coded into AQUIRE if it is reported by the author, if the author's definition of the effect is equal to AQUIRE endpoint definitions, or if the data point is a companion endpoint to a LOEC, NOEC and/or MATC. "Companion endpoints" are endpoints assigned by the reviewer when the statistical results follow a clear concentration-response pattern and the author reports a NOEC, LOEC or MATC but fails to report the "companion endpoint". For example, when an author reports a NOEC and does not specifically define the lowest statistically significant effective concentration as a "LOEC", the data point is coded as a LOEC in AQUIRE by the reviewer. Similarly for reported LOECs without NOECs, NOEC/LOECs without MATCs and MATCs without NOEC/LOECs.

On occasion, authors will report LC50 information in the methods section of their publication, without reporting any accompanying test procedure information. Such information is coded. However, it is important to verify that the authors have not published the data in another publication. For verification, ECOTOX staff may check for duplicate data publication within our database files.

If replicate tests resulting in a number of endpoints, (e.g. LC50s), are conducted, each LC50 must be reported on an independent line, even though the chemical, species, duration and effect are the same.

If a data set is evaluated using more than one statistical analysis all resulting endpoints are coded on separate lines (e.g. 2 LC50s for same data using probit and Spearman-Kärber will be coded as two separate data lines; report statistical method in EE\_Remark). Additionally, note "statistical comparison" in the Other Effects field (see Other Effects section for more information).

#### ENDPOINT HIERARCHY

The following hierarchy defines the priority for including endpoint information in the AQUIRE database. The endpoints listed in category "A" are the highest priority, based on conformance with standard toxicity endpoints, and should be coded if reported in the publication. If the endpoints identified in subsequent categories (F) are also listed in the publication, these endpoints are not coded but are noted in the Other Effects field. If there are no endpoints from category "A" in the publication, then endpoints from category "B", if available, are coded and so on.

Following the endpoint hierarchy, the next two sections define and describe the coding of

trends and effects. Trend information is coded, when available for endpoints as well as effects. Regardless of whether endpoint data is available, any reported effect information is coded.

- A The endpoint is an LC50, LD50, LETC, EC50, IC50, NOEC, LOEC, MATC or BCF (BCFD), or its definition, as reported by the author. For example, if the author does not actually state that the value is an LD50 but states that “concentration x is the dose estimated to be lethal to 50% of the test organisms”, the reviewer should code this as an LD50 endpoint because the author *defines* the LD50. All individual endpoints are coded.

The AQUIRE database recognizes and codes “companion endpoints”; for AQUIRE such endpoints are defined as statistically significant endpoints that neighbor an author-defined NOEC or LOEC.

When a publication reports a LOEC and NOEC for a non-monotonic response pattern (i.e., lower concentration significant and at least one higher concentration not significant); code the LOEC/NOEC reported by the authors, but note Trend as ‘CHG’ and code Signif as MULT to flag non-standard results.

In the AQUIRE database, the occurrence of no mortality (0%) or complete mortality (100%) is treated as an endpoint. The endpoints NR-LETH and NR-ZERO will always be coded for mortality effects of 100% mortality and 0% mortality, respectively. If for a laboratory test exposure the authors report “all fish died”, code as NR-LETH and 100% mortality; however, for a field exposure, unless conducted in an enclosure of some type, it is difficult to assume that truly 100% of the fish are known to be dead, therefore the field exposure report of “all fish died” is coded as MOR, INC and EFCT % is not coded.

The 100% mortality data point at the lowest concentration/ shortest duration is coded. Similarly, the 0% mortality data point at the highest concentration/ longest duration is coded. In contrast to other endpoints, the additional mortality effects are coded along with the NR-LETH and NR-ZERO endpoint data. For example:

**Mortality Table 1**

µg/L	24 H	48 H	72 H	96 H
1	0	0	0	<b>0 NR-ZERO</b>
2	5	17	30	35
3	25	40	65	90
4	<b>100 NR-LETH</b>	100	100	100

A) LC50s reported in publication, code

LC50s	as reported
NR-LETH:	4 µg/L at 24 hr
NR-ZERO:	1 µg/L at 96 hr

## B) LC50s not reported in publication, code

NR-LETH: 4 µg/L at 24 hr  
 NR-ZERO: 1 µg/L at 96 hr  
 MOR: 2-3 µg/L at 24-96 hr

**Mortality Table 2**

µg/L	24 H	48 H	72 H	96 H
1	0	0	<b>0 NR-ZERO</b>	11
2	20	25	38	72
3	45	60	67	90
4	90	<b>100 NR-LETH</b>	100	100

## A) LC50s reported in publication, code

LC50's as reported  
 NR-LETH: 4 µg/L at 48 hr  
 NR-ZERO: 1 µg/L at 72 hr

## B) LC50s not reported in publication, code

NR-LETH: 4 µg/L at 48 hr  
 NR-ZERO: 1 µg/L at 72 hr  
 MOR 1-4 µg/L at 24-96 hr EFCT%: 0-100

**Mortality Table 3**

µg/L	24 H	48 H	72 H	96 H
1	<b>0 START RANGE</b>	0	7	13
2	0	28	45	60
3	38	44	67	100
4	38	60	100	<b>100 END RANGE</b>

## A) LC50s reported in publication, code

LC50's as reported

## B) LC50s not reported in publication, code

MOR 1-4 µg/L at 24-96 hr EFCT% 0-100

**Mortality Table 4**

µg/L	24 H	48 H	72 H	96 H
1	<b>0</b> START RANGE	0	0	0
2	0	0	7	13
3	0	28	45	60
4	38	44	67	100
5	38	60	100	100
6	100	100	100	<b>100</b> END RANGE

A) LC50s reported in publication, code

LC50's as reported  
MOR 1-6 µg/l at 24-96 h, EFCT% 0-100

B) LC50s not reported in publication, code

MOR 1-6 µg/l at 24-96 h, EFCT% 0-100

**Note:** The term "nil" is defined as "naught or nothing", therefore, when used by an author, it will be assumed to mean 0% mortality.

- B The endpoint is an author reported TLM, TL50, chronic value (ChV) or any terms with equivalent definitions that define endpoints such as those listed in Appendix G. The equivalent AQUIRE endpoint is coded in the endpoint field.
- C The endpoint is LCxx, LDxx, ECxx, ICxx (other than 50% value). The endpoint is coded only if the endpoints listed in A or B are not abstracted from the publication.
- D The endpoint is LT50, ET50. The endpoint is coded only if the endpoints listed in A and B and C are not abstracted from the publication.
- E The endpoint is LTxx, ETxx. The endpoint is coded only if the endpoints listed in A, B, C and D are not abstracted from the publication.
- F The endpoint is a delayed exposure effect (~xxx). The delayed effect endpoint is coded if no similar exposure endpoint above has been coded. A specific exception is gut clearance prior to tissue analysis; e.g., "after the exposure the organisms were placed in clean water for 10 hours to allow the organism to clear the stomach contents". This type of clearance is distinguished from depuration and is not coded as a delayed effect. See **NOTE:** on page 4.C-10 and Appendix I for examples.

### Trend

The observed or measured response trend as compared to the control is coded when reported or graphically displayed. When statistical comparisons are presented for multiple controls (e.g., statistics in relation to a standard control and statistics in relation to a solvent control), note the appropriate control in EE\_Remark.

The trend for BCF, LCxx, LTxx is coded as "inc", except for the effect SVC (shell valve closure) which is coded as "dec". The trend for ECxx, NOEC, LOEC and MATC will be either "inc", "dec", "chg" or NR depending on the results of the test. The trend is noted as a two or three letter code:

## CODE: TREND:

INC	increase
DEC	decrease
NEF	no observed effect; e.g., when coding NR-ZERO the trend is NEF
CHG	no clear trend, results are variable (e.g. any combination of above trends listed)
NR	no trend reported or if no control response is reported then the trend is not able to be identified

EXAMPLE: When a clear response, or lack thereof, is observed within an effect, it is coded as either INC, DEC, or NEF. The measurement used to evaluate the effect is reported in EE-Remark, for example:

EFCT: GRO      TREND: INC      EE\_Remark: length//

When lumping data or when multiple trends are reported, code CHG in the trend field and report the individual trends in EE\_Remark as in the following example:

EFCT: ENZ      TREND: CHG      EE\_Remark: inc ATPase, dec malic dehydrogenase,  
NEF succinate dehydrogenase

### Effect

For AQUIRE database purposes, a toxicological effect is the observation or measurement of a response resulting from the action of a chemical stressor (e.g., mortality). The AQUIRE database internally categorizes all observed effects under at least one of eight major effect group codes (behavior, bioconcentration, ecosystem, growth/development, lethal, physiological/biological, population community, and reproduction). Appendix H identifies the three letter AQUIRE effect codes, major effect group and associated AQUIRE records. Appendix I describes the major groups and associated effect definitions for each three letter code. The major effect groups are not used by reviewers; their purpose is to provide database users the capability to search on broad groups of effects without specifying each individual effect. See Section 8. Scientific Outreach Support for additional user support information.

The reported effect is interpreted to conform to the AQUIRE defined effects. If the effect is on the list of AQUIRE effects, use the AQUIRE effect code (Appendix I). If the author's effect is not in Appendix I, but is similar to one already defined use the AQUIRE code which matches the definition and note the author's effect term in the EE\_Remark field. If the author's effect appears to be a new effect code, discuss and forward to EPA Data Manager for approval.

Listed at the end of Appendix I there are two special effect code conventions used in AQUIRE. The first is MUL, used only for Endpoints reported by the author as MULTiple effects, e.g. "mortality and growth". This code is used *only* when such effects cannot be separated into or reported as individual effects. The MUL code is rarely used and when used must be verified by one or more fully trained reviewers.

The second effect code convention is ~XXX to indicate that the result reported was observed after the exposure period ended, i.e., a delayed response. Within one publication, delayed response data is reported only if exposure period observations are not available for the same effect or endpoint. When delayed response data accompanies exposure period observations, the delayed response data is recorded in Other Effects as "recovery".

**NOTE:** A specific exception is gut clearance prior to tissue analysis; e.g., “after the exposure the organisms were placed in clean water for 10 hours to allow the organism to clear the stomach contents”. This type of clearance is distinguished from depuration and is not coded as a delayed effect. See page Appendix I; RSD definition box for coding guidelines.

### *Combining Effect*

Multiple test results from a single experiment for the same chemical, species, lifestage, duration, and effect may be combined into one test record if no statistics are presented, except when:

- The effects within each group are statistically analyzed and differ from each other. Code each result as a separate line, unless by so doing the results are reported in a biased way, ie., giving more weight to the significant species and by grouping the non-significant ones the effect is blurred. In these cases, combine the results and code as MULT significance:

Species: Algae Org Charac: 3 orders Effect: ABD Trend: CHG Signif: MULT

Combining effect data is applicable only if distinguishing statistical analysis and/or endpoint information is not reported. For example, in a growth test if, for a given chemical, species and test duration, there are multiple lengths or weights reported for the test individuals, the data can be reported generally as a weight/length increase or decrease for the test species as a whole. However, if some of the weights or lengths reported are statistically significant from the control, this data must be reported individually.

For tests where only one exposure concentration is used and results are reported for multiple durations; the data may be combined over time. For example, results for a series of enzyme levels which vary in significance over time may be combined over the total range of the exposure duration.

When there are several measurements for one effect and statistics are presented, it may be appropriate to report the measurements as one effect. For example, ENZyme data may be reported as specific ECOD, EROD and UDP-GT measurements. Even though two or more of the measurements have varying statistical response they may be combined into one effect record.

Efct: ENZ Trend: CHG EE\_Remark: inc ECOD, EROD, dec UDP-GT// Signif: MULT

Many publications which report field data or laboratory microcosm studies present results for multiple species/taxonomic groups. The lumping of results for species and taxonomic groups depends on whether statistics were applied to the data and whether a similar response is evident.

- If, within a higher taxonomic group (eg., Algae), individual effects for several lower taxonomic groups are also presented (eg., Bacillariophyta (diatoms), Chlorophycota (green algae), Pyrrophyphyta (dinoflagellates)) the data may be reported in a number of ways. Examples include:
- The effects within each group are statistically analyzed and are similar overall, ie., INCreasing, DECcreasing or CHanGing. Combine the results and code as:

Species: Algae      Org Charac: 3 orders    Effect: ABD    Trend: INC    Signif: SIG

- The effects within each group are statistically analyzed and differ from each other. Code each result as a separate line:

Species: Bacillariophyta      Effect: ABD    Trend: INC    Signif: SIG  
 Species: Chlorophycota      Effect: ABD    Trend: DEC    Signif: SIG

- If no statistical analysis has been reported, the results from the lower taxonomic groups can be lumped into a single record representing the next highest representative taxonomic group.

Species: Algae    Org Charac: 3 orders    Effect: ABD    Trend: CHG    Signif: NR

## EFFECT HIERARCHY

- A. If the author has defined an Endpoint for an effect, report the Endpoint as outlined in the preceding ENDPOINT HIERARCHY.
- B. When only effects are reported in the publication, no endpoints, code the concurrent effects (results reported concurrent with exposure to chemical) according to the abbreviations in Appendix I. Code NR (not reported) in the Endpoint field.
  - i. If statistics are presented in a clear dose response, code the lowest significant effect and the highest nosig levels and appropriate p-values.
  - ii. If statistics are presented and there is no clear dose response, code as a MULT and the appropriate value.
  - iii. If no statistics are used, or reported, lump the effect data by coding a range for concentration and duration. Report as NR in the Statistics and Level fields.
- C. When the only effects that are reported are those subsequent to exposure, report these as delayed effects, noted with a ~ preceding the three-letter effect code, e.g. ~MOR. Follow the procedures outlined in Steps B i, ii, iii for reporting delayed effects.

## Tissue

A tissue code is used to identify specific organ and tissue effect sites for residue, biochemical and/or physiological effect measurements. For example, tissue sites are used for BCF/RSD, BIO, CEL, HIS, PHY, GRO, and SMI effects and associated endpoints. The two letter tissue codes are listed in Appendix J.

## Combining Tissue

If residues for a number of tissues are presented along with statistical results, and a clear dose-response is apparent, report results for each tissue separately. Results for a single effect with statistical results broken out by tissue type may be combined, but should be combined based on effect and statistical results. If statistics are not presented, combine the results into one data record.

When the residue measured in one organ or tissue is further analyzed to indicate concentrations in cells or cellular fractions, a comment is placed in the Remark field (e.g., TISSUE/subcellular fraction// or TISSUE/subcellular distribution//).

If the MT code is used, the individual tissues/organs are coded in the Remark field (e.g., TISSUE/LI,KI,GI//). If the tissue does not have a tissue code, write out the tissue name and include a note with the coding sheet requesting a new tissue code be added. When tissue is not reported, the tissue code field is coded as NR. If whole organism and multiple tissues are listed, code "MT" in tissue field and code WO and additional specific tissue codes in the Remark field (e.g. TISSUE/WO, LI, GI, HE//).

### EE\_Remark

This field contains additional endpoint and/or effect text, as described by the author. The types of information coded include:

EXAMPLE 1: The endpoint terminology used by the author when an ACQUIRE-defined endpoint was coded rather than the author's term. For example,

Endpoint: LC50EE\_Remark: TLM or Median Period of Survival//

EXAMPLE 2: When the coded effect is broad, e.g. BIO, but the publication provides specific effect information, such information is reported in EE\_Remark:

Effect: BIO EE\_Remark: protein, lipid, carbohydrate//

If there are no remarks pertaining to either the endpoint or the effect, the field is left blank.

### Effect Percent (EFCT %)

This field is used when the effect is reported as a percent change, e.g. percent of the total population or percent increase or decrease.

If the author reports the number dead (i.e., "5 of 20") do not recalculate as a percent.

EXAMPLE 1: "80% mortality" Efct: MOR Efct %: 80 Measurement: MORT

EXAMPLE 2: "25% survival" Efct: MOR Efct %: 25 Measurement: SURV

EXAMPLE 3: "5 of 20 died" Efct: MOR Trend: INC

EXAMPLE 4: "45% inc ATPase activity" Efct: ENZ Trend: INC Efct%: 45 Measurement: ATPA

If the percent effect is coded from a graph, code the percent values using a qualifier, ie. <, >, or ~, using only the graphical intervals reported on the graph. Place a slash in the field and code Efct%/from graph// in the Remarks. If the percent effect is graphed and is not clear enough to extrapolate, code "graphed" in Efct % field.

If the effect percent is not reported, the field is coded as NR.

If the percent effect is presented as "xx% of the control", place a "/" in the Efct % field and code: EFCT %/xx% of control// in the Remark field.

*Combining Effect Percent*

When data for an effect are combined because a statistical analysis was not applied and/or a clear dose response was not observed, and several percent effect values are presented, there are two different ways to report data.

1. If the author reports the effect measurement on a single parameter, the effect percent is reported as a range.

EXAMPLE 1: 30-75% mortality      Efct: MOR      Trend: INC      Efct%: 30-75

EXAMPLE 2: 20-30% dec O<sub>2</sub> consumption      Efct: OXC      Trend: DECEct%: 20-30

2. If the effect measurement on two or more parameters is combined for coding and as a result the trend reflects more than one direction, eg., encompasses both increase and decrease, the effect percentages are coded as "COM" (combination). COM is used in limited circumstances when it is not possible to report the individual percent values.

EXAMPLE: 20-50% dec glycogen, 70-80% inc protein

Efct: BIO      Trend: CHG      Efct%: COM      EE-Remark: dec glycogen, inc protein

*Statistical Significance (SIGNIF)*

The statistical significance field is coded when the author has presented statistical analysis as compared to the controls in the test result. If statistics are presented in the publication, unless the authors state otherwise, assume that the exposure treatments were compared to the controls.

When statistical comparisons are presented for multiple controls (e.g., statistics in relation to a standard control and statistics in relation to a solvent control), both sets of results are coded. In these instances, note the specific type of control used in the statistical analysis in the EE\_Remark section.

Signif is coded as "NA" for records having an endpoint of MATC, LCxx, ECxx, LTxx, BCF, ETxx, ICxx, LDxx, LETC, BCFD. For NOEC, LOEC and effects without endpoints, code significance as author reports, or NR.

When a publication reports a LOEC and NOEC for a non-monitonical response pattern (i.e., lower concentration significant and at least one higher concentration not significant); code the LOEC/NOEC reported by the authors, but note Trend as 'CHG' and code Signif as MULT to flag non-standard results.

The reviewer interprets hypotheses tests to determine a dose response endpoint. A significant clear dose result is coded as SIG; no significant dose result is coded as NOSIG. Only the highest NOSIG and the lowest SIG concentration is reported; unless all concentrations are SIG or all concentrations are NOSIG. In this instance, code all the concentrations as a range. If the significance level is reported, it is coded in the Level field described below.

In cases where the author reports only a SIG or NOSIG, code the companion data point. For example, if a stat sig "growth" is reported in the text and in the table sig is noted the reviewer

should pick the nosig level and report this also.

If the author states that there is a statistically significant increase or decrease in an observed effect, whether or not they report the statistical method used, but does not report a significance level, code SIG or NOSIG and NR in level field.

If the author states there is a significant increase or decrease in an observed effect but does not say it is "statistically significant," code NR in Signif field.

- When the highest concentration and all lower concentrations tested show no significant response, code NOSIG and range all concentrations in CONC field.
- When the lowest concentration and all higher concentrations tested show a significant response, code SIG and range all concentrations in CONC field.
- If only one concentration is tested and statistics are performed, code SIG or NOSIG in stats and "only conc tested" as a CONC remark.

### *Combining of Statistics*

If there is no clear dose response on a single parameter effect interpreted by the reviewer when statistics are reported, it is coded as multiple significance (MULT).

**EXAMPLE:** Five concentrations are tested and the two highest and two lowest show significance but the middle concentration does not, code MULT.

**EXAMPLE:** If an effect has multiple parameters, some parameters are significant, others are not significant, code MULT and identify parameters in EE\_Remark.

**EXAMPLE:** Change in ion concentration in the blood. Chlorine and calcium are significant and sodium is not significant. Code Signif field as MULT.

**EXAMPLE:** A publication reports a LOEC and NOEC for a non-monotonic response pattern (i.e., lower concentration significant and at least one higher concentration not significant); code the LOEC/NOEC reported by the authors, note Trend as 'CHG', and code Signif as MULT to flag non-standard results.

**Note:** The MULT code is not used to represent a combination of data which has been statistically analyzed with data that has not been analyzed. Code the statistical data over the non-statistically analysed data. For example, in an instance where the exposure duration is 5 days, and the statistical results presented are for 4 days; code the statistical results, note the duration as 4 days, place a slash in the duration field, and enter the exposure duration (5 days) in the Remark field.

### *Significance Level (LEVEL)*

The level of significance (e.g. test statistic) is coded when the author has reported statistical analysis in the test result. The terminology for significance level may be presented as:  $p =$ ;  $p$ - or alpha value;  $\chi^2$ ; for t-test; % level. The terminology are equivalent and are generally in the range of  $p = 0.10$  to  $p = 0.001$ .

Level is coded as "NA" for records having an endpoint of MATC, LCxx, ECxx, LTxx, BCF, ETxx, ICxx, LDxx, LETC, BCFD. However, when the confidence level is other than 95%, the level is coded as reported.

### *Combining of Level*

When a range of concentrations is coded, and there are multiple levels of significance reported, range the values.

EXAMPLE: At all concentrations (10-50 ug/L) growth was significantly affected. At 10 ug/L the p value was  $p < 0.05$ , at 50 ug/L the p value was  $p < 0.001$ .

CONC: 10-50 SIGNIFY: SIG LEVEL:  $P < 0.05$  -  $< 0.001$

### Other Effects (Other Efct)

Comments regarding other toxicity tests or effects reported in the publication that do not meet AQUIRE minimal requirements for coding are coded in this field. A keyword list (Appendix K) for common terms is used as a guideline to assist the reviewer. The effect or endpoint codes are used when appropriate. The reviewer should maintain a list of new keywords and periodically submit this list to the EPA Database Manager. Commas separate each distinct term and the text ends with a double slash (//).

Other Efct: uptake, LC50 graphed//  
Other Efct: toxicity symptoms, diet exp//  
Other Efct: mixture, effluent//

If other chemicals are tested as a mixture with the test chemical, ie., there is an entry in Other Chemicals, the keyword "mixture" is coded in the Other Effects field.

When water chemistry effects (temperature, salinity, pH) are tested in conjunction with chemical toxicity, a Remark is coded in Other Effects to reflect this type of interaction.

Other Efct: salinity effects//

### Test Result Examples

1. If the author has defined an ENDPOINT and/or has reported a 0% and/or 100% mortality response, report the endpoint/mortality as outlined in the Endpoint Hierarchy. Select the appropriate effect as described below.

#### ENDPOINT REPORTED (NR-ZERO):

ENDPOINT: NR-ZERO	SIGNIF: NR	TREND: NEF
EFFECT: MOR	EFCT%: 0	LEVEL: NR

If applicable, statistical results should appear in the SIGNIF field, the level of significance should be reported in the LEVEL field, the percent effect should be presented in the EFCT% field, and the trend should be reported in the TREND field.

#### ENDPOINT REPORTED (LOEC):

ENDPOINT: LOEC	SIGNIF: SIG	TREND: DEC
EFFECT: GRO	EFCT%: 20	LEVEL: $\alpha < 0.05$

**Note:** For NOEC endpoints, NOSIG is coded in the SIGNIF field. For LOEC endpoints, SIG is coded in the

SIGNIF field.

2. If the author-reported effect is a clear dose response result using statistical analysis, and the author does not identify an endpoint, select the appropriate effect from Appendix I.

Clear dose response data where a statistically significant effect was observed, are represented by two data records. One data record represents the lowest concentration at which a statistically significant effect occurred. "SIG" is coded in the SIGNIF field, the observed trend is coded in the Trend field, the percent effect is coded in the EFCT% field, and the level of significance is reported in the Level field. Remarks on the effect are made in the EE\_Remark field.

#### CLEAR DOSE RESPONSE:

ENDPOINT: NR	SIGNIF: SIG	TREND: DEC
EFFECT: GRO	EFCT%: 20	LEVEL: $\alpha < 0.05$
EE_REMARK: total length//		

The second data record represents the highest concentration at which no effect occurred. NOSIG is coded in the Signif field. If a percent effect is reported it is presented in the EFCT% field.

If the concentration identified as SIG is the lowest concentration reported or the concentration identified as NOSIG is the highest concentration reported, report the range of concentrations and the appropriate code in the Signif field.

If only one concentration is tested, code the SIGNIF field appropriately and note "only conc tested" as the concentration (CONC) remark in the Remark field.

3. If the author reported effect shows unclear dose response results, using statistical analysis, select the appropriate effect from Appendix I.

When data have been statistically analyzed, and the results presented have significant effects in an unclear dose response pattern (e.g., significant effects at the high and low concentrations, and not significant at the middle concentration), "MULT" is coded in the Signif field to signify multiple significance. The level is coded with a full range of p-values (e.g.  $p < 0.05$ -0.001).

#### UNCLEAR DOSE RESPONSE:

ENDPOINT: NR	SIGNIF: MULT	TREND: CHG
EFFECT: ENZ	EFCT%: COM	LEVEL: $P < 0.05$ -0.001
EE_REMARK:inc ACHE, dec MAD//		

4. If the author reports a descriptive or qualitative effect without statistical analysis, select the most appropriate effect from Appendix I. One record is coded with a full range of exposure concentration and time. The appropriate trend is coded in the TREND field. The percent effect over the concentration tested is reported in the EFCT% field. NR is

coded in SIGNIF and LEVEL fields.

NO STATISTICAL ANALYSIS:

ENDPOINT: NR

SIGNIF: NR

TREND: INC

EFFECT: HIS

EFCT%: NR

LEVEL: NR

EE\_REMARK: lesions//

## 6. Concentration Parameters

### Concentration Type (CONC TYPE)

The three forms of toxicants evaluated in AQUIRE are organic compounds, metals and inorganic non-metals. Each form can be identified as a concentration type code using the single letter abbreviation.

Organic compounds are defined by the pesticidal terms, formulation (F) and active ingredient (A). Publications that do not specify the compound by the definition criteria for active ingredients are by default coded in the formulation (F) category.

Metals are defined by the concentration types, total (T), dissolved (D), and labile/free (L); while ammonia or hydrogen sulfide compounds may have total concentrations (T) and/or un-ionized (U) concentrations.

Organometals are coded as total (T) concentrations. If two representations of a metal or inorganic non-metal concentration are reported in the reference, both concentrations are included in AQUIRE; i.e, both total and un-ionized concentrations are reported in the concentration field. If the author reports the ammonia concentrations as based on  $\text{NH}_4\text{-N}$  or  $\text{NH}_3\text{-N}$ , code CONC TYPE as "T" and "U", respectively. Code the specific ion information in the REMARK section; eg., CONC/as  $\text{NH}_4\text{-N}$ //.

For publications where all three metal types, T, D and L, are reported code T and D as one entry and the L concentration is coded as a separate line. (At some future point when new software is developed, all three concentration types will be associated with one record).

Concentration is also linked to the Chemical Analysis Method (METHOD) field. If measured and nominal concentrations are reported in a publication, report the measured concentrations.

### *Concentration Types and Definitions*

#### Organic:

**FORMULATION (F):** Way in which basic pesticide (toxicant) is prepared for practical use (Ware, 1978). Generally reserved for commercial preparation prior to actual use and does not include the final dilution (Insect-Pest Management and Control, 1971) (e.g.; Baythroid, 2,4-D). Also included in this category are organic compounds with no pesticidal activity (e.g.; PCB, dioxin).

**ACTIVE INGREDIENT (A):** Chemical substance in a product that is responsible for the pesticidal (toxic) effect (Ware, 1978). Reported as "A" when the author refers to the concentration as active ingredient, active principle or various grades of reagents (ie., Analytical, Reagent or Technical). When coding, a value in the publication may be reported as "Al kg/ha" or "kg Al/ha"; in AQUIRE this type of value is reported as 'A =' for CONC TYPE, with units as kg/ha. For example, 100 kg Al/ha is reported as A = 100 kg/ha.

**Note:** Information reported in Chemical Characteristics does not necessarily determine whether concentration is A or F. The author must state that concentration is "as Al". If chem charac is %Al and author reports M conc, then also A= okay? Or if M conc of pesticide is it always A= ?

### Metal/Organometals:

**TOTAL (T):** The concentration of metals determined on an unfiltered sample after vigorous digestion, or the sum of the concentrations of metals in both dissolved and suspended fractions ( APHA et.al. 1992). Heavy metals and single elements (e.g. Na, Cl, Br) are coded as T.

**DISSOLVED (D):** Those constituents of an unacidified sample that pass through a 0.45 um membrane filter (e.g. soluble metal) (APHA et.al. 1992).

**LABILE (L):** The labile or free ion metal concentration determined by various analytical methods. When coding, the specific labile forms or complexes are not differentiated.

### Inorganic non-metals:

Concentrations of ammonia and hydrogen sulfide are reported in the literature in either the total or unionized form. Code the form as specified by the author. Ammonia may be reported as a variety of different forms, eg.,  $\text{NH}_3$ ,  $\text{NH}_4^+$ ,  $\text{NH}_3\text{-N}$ ,  $\text{NH}_4\text{OH}$ , or  $\text{NH}_4\text{Cl}$ . ( USEPA 1979) The author must state whether the form is **Total** or **Unionized**; **T** is the default for ammonia and hydrogen sulfide papers that do not state whether total or unionized concentrations are reported.

**TOTAL (T):** The dissociated, charged form of nitrogen or hydrogen related chemicals. This can take on numerous forms, e.g.; ammonium ( $\text{NH}_4^+$ ), nitrite ( $\text{NO}_2^-$ ), etc. (Rand and Petrocelli, 1985). T is the default for publications that do not state whether Total or Unionized concentrations are reported.

**UN-IONIZED (U):** The undissociated, uncharged form of ammonia or hydrogen sulfide. The ammonia molecule,  $\text{NH}_3$ , is the unionized form. (In aqueous solution, ammonia assumes an equilibrium between  $\text{NH}_3$  and  $\text{NH}_4^+$ .) The  $\text{NH}_3$  is the toxic entity of the ammonia compound (Rand and Petrocelli, 1985).

### Effect Concentration (CONC)

The effect concentration is expressed in  $\mu\text{g/L}$ . The confidence interval, fiducial limits, or range is recorded when available. The water concentration is coded in this field, except for diet studies, where the concentration in the food is coded. If a water concentration is also presented, code the concentration of the diet in the Concentration field. Code the exposure type D with a "/" and code TYPE/water conc rpt// in the Remark field.

Often the concentration is reported in a unit convertible to  $\mu\text{g/L}$ . Examples of such conversions are:

$0.000001 \text{ g/L (ppt)} = 0.001 \text{ mg/L (ppm)} = 1 \text{ } \mu\text{g/L (ppb)} = 1000 \text{ ng/L (pptr)} = 1000000 \text{ pg/L}$

$1 \text{ ng/L} = 0.001 \text{ } \mu\text{g/L} = 0.000001 \text{ mg/L}$

$1 \text{ m}^3 = 1000 \text{ L} \quad 1 \text{ cm}^3 = 0.001 \text{ L} \quad 1 \text{ dm}^3 = 1 \text{ L}$

$\text{g/m}^3 = 1000 \text{ } \mu\text{g/L} \quad \text{ } \mu\text{g/dm}^3 = \text{ } \mu\text{g/L} \quad \text{mmol/dm}^3 = \text{mmol/L}$

A ratio of 1:40,000 =  $1/40000 \times X/1000000 = 25,000 \text{ ppb} = 25,000 \text{ } \mu\text{g/l}$

Occasionally an author will report a concentration as a % or fraction of an LC50 value; e.g., either the sublethal concentration used was "10% of the 96-h LC50" or "1/10, 1/15 and 1/20 of the LC50". Such concentrations may be recalculated and used as the effect concentration if the original LC50 concentration is provided in the publication. Flag the recalculation in the paper so that the calculation may be QA'd and document the recalculation in the margin or

on a blank page of the publication.

When concentrations are recalculated, include a comment in the Remark field (e.g., CONC/recalculated//). When the purpose of the recalculation is to standardize units, ie. mg/l to ug/l; flag the recalculation in the paper so that the calculation may be QAd. If the recalculation is more extensive, document the recalculation in the margin or on a blank page of the publication.

If the concentration is reported in units that cannot be readily converted into µg/L (e.g., mg/kg or µCi/L), the concentration value and its units are recorded as reported. Concentration units are listed in Appendix L.

When concentrations are taken from a graph, put a slash next to the concentration value and note in the Remark field: CONC/from graph//.

Concentrations based on the active ingredient or formulation, or as the total, un-ionized or dissolved concentration, are identified (see Concentration Type). Confidence intervals and concentration ranges are coded if the author reports the values.

In certain cases, the AQUIRE concentration is routinely reported as some form of the test chemical. For metal salts, the concentration is generally expressed as ug ion/L (e.g., Hg<sup>+</sup>).

An exponential number greater than +8 or smaller than -7 (e.g.,  $1 \times 10^8$ ; often reported as  $10^8$ ) is coded as E+n or E-n (e.g., 1 E+8). The concentration field is 10 characters long, therefore numbers less than or equal to +8 or -7 can be written out, eg.  $10^6$  is reported as 1,000,000.

Concentration units are recalculated only if the denominator is not equal to one (e.g., 5ug/20g). Place a slash in the concentration field and note in the Remark field (e.g., CONC/recalculated//). Document the recalculation in the margin or on a blank page of the publication and mark with a colored flag to alert the QA staff.

When the concentration is reported as the metal (e.g., Sn), but the chemical tested is identified as an organometallic (tributyltin chloride ( $C_{12}H_{27}ClSn$ ), enter "T" in the Concentration Type, the concentration is reported in the Concentration field, and identify in the Remark field that the concentration is based on the metal component (e.g., CONC/as Sn//).

If a chemical concentration is reported in the control water, 'contaminated controls' should be noted in the Exp Design field. The concentration of chemical in the controls is not coded.

If in a Diet exposure, water concentration is also reported, a '/' is placed in the Concentration field with CONC/water conc rptd// in the Remark field.

For field data, the water concentration may be reported as NR, if the application rate is reported (see Application Rate field). However, the concentration type (F,A,T,D,L,U) must still be coded in this field along with NR.

#### Bioconcentration Value (BCF)

The bioconcentration factor (BCF) is a unitless value describing the degree to which a

chemical can be concentrated in the tissues of an organism in the aquatic environment. At apparent equilibrium during the uptake phase of a bioconcentration test, the BCF is the concentration of a chemical in one or more tissues of the aquatic organism divided by the average exposure concentration in the water. The unitless number is calculated by dividing the concentration of the exposure chemical found in the tissue by the concentration of the chemical found in the exposure water,

$$BCF = \frac{\text{g/kg chemical in organism tissue}}{\text{g/L chemical in H}_2\text{O}}$$

or it is calculated from a ratio of rate constants, if at steady state,

$$BCF = \frac{K1 \text{ (uptake)}}{K2 \text{ (elimination)}}$$

A bioconcentration endpoint is coded as either wet (or unknown) or as dry weight (BCF and BCFD, respectively). A residue (RSD) effect is coded and the associated BCF value is coded in the BCF field. If the author does not calculate a BCF, the test is recorded as a RSD effect with NR in the endpoint field, and NA in the BCF field.

If a BCF is reported for the parent compound and for a metabolite, record the parent compound BCF and note /metabolite BCF// in Other Effects.

If the BCF is at steady state or equilibrium, it is noted using the term "steady state" in the EE\_Remark field.

If the BCF is normalized for lipid, "lipid normalized" and the % lipid, if available, are reported in the EE\_Remark field.

EE\_Remark: Steady State, lipid normalized 5% lipid//

If an author reports more than one type of BCF, ie. lipid normalized, regular, or radioactive equivalents, for the same data point; code lipid normalized over regular and regular over radioactive equivalents. The secondary analysis endpoint is reported in Other Effects.

Other Effects: radioactive equivalent BCF//

For papers that report BCFs and provide Lethal Body Burden information, note "Lethal Body Burden" in Other Effects. However, in a publication reporting only residue data as lethal body burdens code the effect as RSD and report "Lethal Body Burden" in EE\_Remarks.

#### Exposure Type (TYPE)

Exposures must either be aqueous, through the diet, or by injection. *In vitro* toxicity test results are not coded in the AQUIRE database. If an exposure type is not clearly defined or is not reported, an NR exposure type is coded. Exposure Type codes are listed in Appendix M.

#### Chemical Analysis Method (METHOD)

This parameter identifies whether quantitative analyses of the toxicant concentration in the test water was conducted and whether measured concentrations were used to report the

results. This field represents/defines the concentration which was used in reporting the endpoint or effect; publications may report Measured and Unmeasured concentrations for one test scenario, use the code which represents whether the specific effect/endpoint concentration was measured or unmeasured. If both measured and unmeasured concentrations for the specific effect/endpoint are reported, record only the measured concentrations. <sup>[11/25]</sup> When chemical measurements are conducted on stock solutions, but nominal concentrations are reported for effects or endpoints, code as Unmeasured. When chemical measurements are conducted periodically throughout the exposure but the reported measurements are not correlated with the effects, code as Unmeasured. When chemical measurements are conducted periodically throughout the exposure and the effects are coordinated with the measurements, code as Measured. For non-English publications, code as Not Reported unless explicitly stated to be measured or unmeasured concentrations. Codes are presented below.

- Measured:** clearly states in the paper that the concentrations reported by the author were measured
- Unmeasured:** author clearly identifies that the concentrations are based on nominal values, or the author presents concentration information, but does not report information that chemical analysis was conducted
- Not Reported:** author describes methods for analyzing chemical concentrations, but it is not clear that the values presented are based on measured or nominal concentrations

## 7. Test Duration Parameters

### Exposure Time (TIME)

Exposure time is coded using the units reported in the literature. If exposure time is not reported, the publication is rejected (unless it is an abstract or is a non-English publication). Time information may be extracted from a figure. Average days to hatch or other developmental stage time is reported if the tests were conducted "until hatch" or "developmental stage conclusion".

For a fluctuating or intermittent dosing (P) experiment, the total test time is recorded with the exposure times and intervals between dosages reported in the exposure time REMARK field.

TIME/ 3 pulses of 45 mi each per 24 h//

When an exposure time is not directly linked to a response, the duration is reported as the full range of time, e.g. "during a 10 week period" is coded as "0-10 wk" or if the response is for a portion of the exposure time, ie., from day 2 through 10 wk, then code as 2-70 d.

For delayed effects, report the duration of exposure to the toxicant only. The observation time is not recorded.

### Duration Unit Codes:

minute = mi	day = d	month = mo	second = s
hour = h	week = wk		year = yr

## 8. Water Chemistry Parameters

The following water chemistry parameters are included in AQUIRE, and are coded in appropriate fields. These measured values pertain either to the test water chemistry or the dilution or culture water chemistry values. In the absence of test water chemistry parameters, it is acceptable to report the culture, holding tank, acclimation, control or dilution water, or pretest conditions denoted by an asterisk (\*). Water chemistry parameters measured prior to or after the exposure period are coded only if test water chemistries are not reported in the publication.

When water chemistries differ between samples (e.g., test chamber or water body), and results are obtained from only some of the samples, water chemistries should be reported for only those samples actually tested.

If the parameter unit is a percent (%) include the percent sign in the appropriate field. When the author refers to the water chemistry values as approximate a "~" is coded in front of the value. Graphed data are coded as a range or as "less than" or "greater than" values and the term "graphed" is noted as a Remark, e.g. temp/graphed//.

If water chemistry values can be converted from non-standard units to standard units, recalculate, showing calculations in the original publication, slash the value, and remark /recalc//. See each water chemistry parameter for specific examples and conversions. If the water chemistry value is reported in a non-standard and non-convertible unit, the water chemistry field contains a "/" (slash) and the value and unit are reported in the Remark field.

### Specific Parameters

<u>Temp</u>	-	Temperature is expressed in degrees Celsius (convert F to C). For converted values, code a slash in the field and remark, e.g., temp/recalc//. When temperatures are reported for incubation chambers or water baths, these temperatures are acceptable for reporting as test temperatures. Do not code temperatures noted as "room temperature".
<u>Hard/Alk</u>	-	Hardness and alkalinity are expressed as mg/L as CaCO <sub>3</sub> . If the author only reports the terms "hard" or "soft," these terms are recorded. If the author reports a hardness or alkalinity value, but does not identify a unit and/or refers to the value as "total", standard units are assumed and the value is coded. If the hardness or alkalinity value is reported with units other than mg/l; code a slash in the field and put the full value and units in Remarks. For example, DO/ 2.7 dH// for values reported in German degrees of hardness.
<u>DO</u>	-	Dissolved oxygen is reported in mg/L or percent saturation. When coding % saturation values, the "%" sign is also coded in the data field. A "SAT" code is used for 100% saturation.
<u>pH</u>	-	pH is reported.
<u>Salinity</u>	-	Salinity is expressed in parts per thousand (ppt) or as percent seawater. When coding % values, the "%" sign is coded, along with the value, in

the data field. Practical salinity units (PSU) are “nearly identical” to parts per thousand (Pond and Pickard 1983) and will be coded as such for ECOTOX, ie. 34 PSU = 34 ppt. PSU is used for salinity values calculated from conductivity measurements recorded by submersible instruments (eg., CTDs, Seabird©).

- Cond - Conductivity is customarily reported as  $\mu\text{mho/cm}$  ( $= \mu\text{S/cm}$ ). In the International System of Units, the reciprocal of the ohm is the siemens (S) and conductivity is reported as millisiemens per centimeter (mS/m). (APHA et.al. 1992) If a publication reports conductivity as S; convert to ohms using the following conversions:
- $1 \text{ mS/m} = 10 \mu\text{mho/cm}$        $1 \text{ mS/cm} = 1000 \mu\text{mho/cm}$        $1 \mu\text{S/cm} = 1 \mu\text{mho/cm}$   
 $1 \text{ mmhos/cm} = 100 \mu\text{mhos/cm}$
- Org C - Organic carbon is expressed in mg/L as C (T = Total, P = Particulate, D = Dissolved); if more than one type of organic carbon is reported in the publication, record T in the field and the other values (P or D) as a Remark; if the value is reported as “organic carbon” without identifying type, assume the value is expressed as Total and report as T. Sediment organic carbon values are not reported.

## 9. Remark Parameters

The Remark field contains additional information about a coding field. The coding sheet does not reflect a discreet Remark field. Reviewers should code remarks in available blank space. Remarks for an ACQUIRE field begin with a field name identifier, then a slash (/), followed by text and end with a double slash (//).

CONC/As Cu//

When additional information is necessary for coding a field, a slash is placed in the coded field and a remark field name identifier is placed in the Remark field to link the remark to the coded field. A complete list of field names is documented in Appendix N.

## 10. Field Testing Parameters

### Habitat Description (HAB)

In the first box, a one-letter code based on the Cowardin system code (Appendix O) is used to describe the habitat (eg., Lacustrine or Riverine). The descriptor field is used to record the author's description of the water body, e.g. brackish marsh, oligotrophic lake, plastic tub, polyethylene lined enclosure. If the author does not provide any information about the habitat, both fields are coded as NR (not reported).

A list of the applicable Cowardin codes as well as some common habitat descriptors are presented in Appendix O.

Habitat Code	
P	concrete tanks in natural pond

Substrate (SUBSTR)

The bottom substrate is recorded as a two letter code by using the Substrate codes listed in Appendix P. If there are no applicable codes, record as the author states in the literature. If a substrate is not reported, NR is recorded. A mixture of sediment types is coded as "MX" and should also include text for the most prevalent soil type(s) in the mixture.

Differentiate between organic and mineral soil/sediment by recording O for organic (leaves, detritus, debris) and M for mineral. Report % organic matter, if reported in literature.

Substrate	
MX	SA, GR, rocks

Water Depth (DEPTH)

Water depth is coded for the study site, as reported by the author. The software will convert the depth to a metric unit. "NR" is coded in the Depth field if the author does not report the water depth at the study site. If the author only reports the water depth of the entire system or the depth at which experimental units (i.e., cages) are suspended, "NR" is coded, and depth information is included in the Experimental Design field.

Location

Water body, city, county or relevant site information is coded. See Appendix Q, for field location abbreviations.

Geographic Text (ST/PR/COUNTRY)

This field will contain the state, province or country name of the test site (do not abbreviate; do not use the codes). If the test site is not reported, an "NR" is coded. Appendix R contains a listing of country, region and province names.

Latitude/Longitude (LAT/LONG)

If reported by the author the latitude and longitude are recorded. If a range is reported, place a slash in the field and report range in Remark field. If not reported, NR is recorded. An example of a longitude/latitude location (MED, Duluth, MN) is listed below:

Latitude:	46°50'51" N
Longitude:	92°11'12" W

NOTE: The "~" sign replaces the "°" sign in data entry.

Application Type (AP TYPE)

This code will contain the method of application of the chemical. Application type codes are located in Appendix S.

For instances where the reviewer is unsure whether the chemical was applied directly to the

water body by pumping, pouring, metering, etc., "DA" (Direct Application) will be coded.

#### Application Frequency (AP FREQ)

Record the number of doses applied during the exposure. If the dose is a non-pulsed, continuous flow, code "continual" in the AP FREQ field. Examples of continual exposures include artificial stream experimental systems and in situ exposures. If an application frequency is not reported, record NR. "Times" is written as X (e.g. 1X, 2X).

AP FREQ: 3X per mo//

AP FREQ: 4X//

AP FREQ: Continual//

#### Application Rate (AP RATE)

This field contains the application rate value and the units that the author reports. If an application rate is not reported by the author, record as NR. If an exposure concentration is not reported by author, the application rate must be reported. Application rate units are recalculated only if the denominator is not equal to one (e.g. 5 g/2.5 ac). A comment is noted in the Remark field (e.g. AP RATE/recalculated//). Document the recalculation in the margin or on a blank page of the publication and mark with a colored flag to alert the QA staff.

#### Chemical Half-life (HALF LIFE)

Record chemical half-life in water. If information about the half-life is not reported, record NR.

#### Application Season (AP SEAS)

This field is used ONLY if no application date is given by the author but the author does specify a season. This field contains the season of initial application of the chemical.

#### Application Date (AP DATE)

The application date is the time of initial exposure. The format is MO-DA-YR, e.g. 12-01-93, 01-00-75, 00-00-64. If more than one initial date is reported (e.g. more than one pond exposed), record the additional dates as a Remark. If one pond is exposed multiple times, only report the first application date and note #x in frequency. If the application date is not reported, NR is recorded.

## GLOSSARY

(excerpted from Rand 1995)

**Acute:** Having a sudden onset, lasting a short time. Of a stimulus, severe enough to induce a response rapidly. Can be used to define either the exposure or the response to an exposure (effect). For clarity, the length of the exposure (short, medium, or long) and the nature of the effect end point (lethal or nonlethal) should be specified. The duration of an acute aquatic toxicity test is generally 4 d or less and mortality is the response measured.

**Bioconcentration:** A process by which there is a net accumulation of a chemical directly from water into aquatic organisms resulting from simultaneous uptake and elimination.

**Bioconcentration factor (BCF):** A term describing the degree to which a chemical can be concentrated in the tissues of an organism in the aquatic environment as a result of exposure to water-borne chemical. At steady state during the uptake phase of a bioconcentration test, the BCF is a value which is equal to the concentration of a chemical in one or more tissues of the exposed aquatic organisms divided by the average exposure water concentration of the chemical in the test.

**Chemical Half-Life:** The time required to reduce by one-half the concentration of a material in a medium or organism by transport, degradation, transformation or depuration.

**Chronic:** Involving a stimulus that is lingering or continues for a long time: often signifies periods from several weeks to years, depending on the reproductive life cycle of the aquatic species. Can be used to define either the exposure or the response to the exposure (the effect). For clarity the length of the exposure and the nature of the effect endpoint should be specified. Chronic exposure typically induces a biological response of relatively slow progress and long continuance. The chronic aquatic toxicity test is used to study the effects of continuous, long-term exposure to a chemical or other potentially toxic material on aquatic organisms.

**Sublethal:** Below the concentration that directly causes death. Exposure to sublethal concentrations of a material may produce less obvious effects on behavior, biochemical and/or physiological functions, and histology of organisms.

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**APPENDICES for the AQUIRE CODING GUIDELINES****APPENDIX A. AQUIRE CODING SHEETS**

- A1. AQUIRE Lab Coding Sheet
- A2. AQUIRE Field Coding Sheet

**APPENDIX B. PURITY CODES**

- B1. Chemical Grades
- B2. Chemical Characteristics

**APPENDIX C. RADIOLABEL CODES****APPENDIX D. SOLVENT CHEMICALS****APPENDIX E. TEST CONTROL CODES****APPENDIX F. TEST LOCATION CODES****APPENDIX G. ENDPOINT CODES****APPENDIX H. EFFECT CODES****APPENDIX I. EFFECT CODES BY MAJOR GROUP****APPENDIX J. ECOTOX TISSUE CODES****APPENDIX K. KEYWORDS FOR REMARKS TEXT FIELDS****APPENDIX L. CONCENTRATION UNITS****APPENDIX M. EXPOSURE TYPE CODES****APPENDIX N. AQUIRE DATA FIELD ABBREVIATIONS****APPENDIX O. COMMON HABITAT DESCRIPTORS****APPENDIX P. SUBSTRATE CODES****APPENDIX Q. FIELD LOCATION ABBREVIATIONS****APPENDIX R. GEOGRAPHIC TEXT****APPENDIX S. APPLICATION TYPE CODES**

5. TEST

CHEMICAL

2. S/V

3. S/V

AQUIRE LAB CODING SHEET (January 6, 2000)

GRADE

PURITY

CHARACTERISTICS

RADIO LABEL

CAS NUMBER

REF #, AUTHOR, YEAR

TOTAL TESTS

REVIEWER

DATE / /

STUDY TYPE

FW | SW | NR

LAB | NR

QA DATE / /

INITIALS

Loc No	Latin Name Species Number	Organism Characteristics	C n f	Endpoint T end Effect Tissue	Measure Efect % Sig Level	Conc Type, Concentration and Range or CI (µg/l)	BCF	Exp Time	E x p T v b	M U	T e m p	Hard CaCO <sub>3</sub>	Alk. CaCO <sub>3</sub>	D.O.	pH	Sa-l- inity	Cond	Org C
																		D T P

EXP. DESIGN:

EE\_REMARK:

OTHER EFCT:

																		D T P

EXP. DESIGN:

EE\_REMARK:

OTHER EFCT:

																		D T P

EXP. DESIGN:

EE\_REMARK:

OTHER EFCT:

																		D T P

EXP. DESIGN:

EE\_REMARK:

OTHER EFCT:

Loc No	Latin Name Species Number	Organism Characteristics	Cnt	Endpoint Trend Effect Tissue	Measure Efct % Sig Level	Conc Type, Concentration and Range or (µg/l)	BCF	Exp Time	Exp Typ	W/U-	Temp	Hard Ca <sub>3</sub> CO	Alk Ca <sub>3</sub> CO	D.O.	pH	Sa-linity	Cond	C

EXP. DESIGN: EE\_REMA

OTHER EFCT: |

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

EXP. DESIGN: EE\_REMA

OTHER EFCT: |

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

EXP. DESIGN: EE\_REMA

OTHER EFCT: |

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

EXP. DESIGN: EE\_REMA

OTHER EFCT: |

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

EXP. DESIGN: EE\_REMA

OTHER EFCT:

# ECOTOX Aquatic Coding Guidelines

## APPENDIX B. PURITY CODES

### Appendix B1 Chemical Grades

ACS	American Chemical Society Grade
AN	Analar Grade
AL	Analysis Grade
A*	Analytical Grade
AR*	A.R. Grade
B	Biological Grade
CG	Chemical Grade
CH	Chromatography Grade
C	Commercial Grade
EM	Eastman Grade
EL	Electrophoresis Grade
F	Field Grade
FG	Fisheries Grade
FFL	Free-Flowing Grade
GR	GR Grade
GU	Guaranteed Grade
GUR	Guaranteed Reagent Grade
HPLC*	High Performance Liquid Chromatography Grade
HG	Histological Grade
I	Industrial Grade
L	Laboratory Grade
MK	Merck Grade
MRG	Merck Reagent Grade
ME	Monsanto Electrical Grade
NAF*	National Formulary Grade
NR	Not Reported
OP	Optima
PAN	Pestanal Grade
PST	Pesticide Grade
PAS	Pesticide Analytical Grade
PRG	Pesticide Reagent Grade
PH	Pharmaceutical Grade
PRA*	Practical Grade
PR	Production Grade
PG*	Pure Grade
R*	Reagent Grade
RFG	Reference Grade
RE	Research Grade
RS	Residue Grade
SC	Scintillation Grade
SO	Solvent Grade
S	Spectrophotometric Grade

TA	Technical Acid Grade
T*	Technical Grade
TIS	Tissue Culture Grade
UP	Ultrapure Grade
ULV	ULV Grade
A* or R*	Analytical or Reagent Grade**
AN or R	Analar Grade or Reagent Grade
T* or A*	Technical Grade or Analytical Grade
T or PU	Technical Grade or Pure

\* Code as A for concentration type for organic chemicals

### Appendix B2 Chemical Characteristics Codes

AE	Acid Equivalent
AI	Active Ingredient
ASG	Agricultural Suspension
ARST	Analytical Reference Standard
AQ	Aqueous Solution
AS	Aqueous Suspension
AAPS	Atomic Absorption Primary Standard
CP*	Chemically Pure
CRI	Chromatographically Impure
CRP	Chromatographically Pure
CF	Commercial Formulation
CO	Concentrate
CR	Controlled Release
CRY	Crystal
DC	Detached Crystals
DP	Dispersable Powder
D	Dust
EC	Emulsifiable Concentrate
EF	Emulsifiable Formulation
EG	Emulsified Granular
E	Emulsion
ES	Emulsifiable Solution, Agent
EN	Encapsulated
FFO	Field Formulated
FCASS	Fisher Certified Atomic

FF	Absorption Standard
FO	Flowable Formulation
GCR	Formulated Gas Chromatograph Standard
GS	Gaseous
G	Granule, Granular
GU	Guaranteed
HG	Heavy Granular
LD	Liquid
N	Nanograde
ND	Neutralized, Desensitized
NF	Nonionized Form
ODA	Organic Dispersal Agent
PAR	Particulate
PEL	Pellet
PAS	Pesticide Analytical Standard
PO	Powder
PRE	Prepared in Lab
PS*	Primary Standard
PA	Pro Analsi Quality
PU*	Pure Purissium or Puris
PF*	Purified
RC	Recry stallized
RST*	Reference Standard
RF	Registered Formulation
SP	Soluble Powder
SPL	Spray Liquid
SPO	Spray Powder
ST	Standard
STD	Standard Solution for AA
USP*	United States Pharmacopeia
UD	Unneutralized, Desensitized
WD	Water Dispersable
WMC	Water Miscible Concentrate
WS	Water Soluble
WSC	Water Soluble Concentrate
WP	Wettable Powder
WHO	World Health Organization
.	

\*\*Code as A for concentration type for organic chemicals

# ECOTOX Aquatic Coding Guidelines

## APPENDIX C. RADIOLABEL CODES

Ag-110	Silver	N-15	Nitrogen
Am-241	Americium	Ni-63	Nickel
As-74	Arsenic	Np-235	Neptunium
Be-7	Beryllium	Np-237	Neptunium
Cd-109	Cadmium	NR	Not Reported
Cd-115	Cadmium	P-32	Phosphorus
Ca-45	Calcium	Pb-203	Lead
C-12	Carbon	Pb-210	Lead
C-13	Carbon	Pu-237	Plutonium
C-14	Carbon	Pu-239	Plutonium
Cl-36	Chlorine	Ra-226	Radium
Cm-244	Curium	S-35	Sulfur
Co-57	Cobalt	Sb-125	Antimony
Co-60	Cobalt	Se-75	Selenium
Co-64	Cobalt	Sn-113	Tin
Cr-51	Chromium	Na-25	Sodium
Cs-134	Cesium	Sr-85	Strontium
Cs-137	Cesium	Sr-90	Strontium
Cu-63	Copper	Tc-95	Technetium
Cu-64	Copper	Tc-99	Technetium
Cu-65	Copper	Te-128	Tellurium
Eu-152	Europium	Tl-115	Thallium 115
F-18	Fluorine	Th-232	Thorium
Fe-59	Iron	Th-238	Thorium
H-3	Hydrogen (Tritium)	U-232	Uranium
Hg-197	Mercury	U-235	Uranium
Hg-203	Mercury	U-238	Uranium
I-125	Iodine	V-48	Vanadium
I-131	Iodine	V-49	Vanadium
Mn-54	Manganese	Zn-65	Zinc

**APPENDIX D. SOLVENT CHEMICALS**

<b>Chemical Name</b>	<b>CAS #</b>
Acetate	71501
Acetic acid	64197
Acetone ( 2-Propanone)	67641
Acetonitrile	75058
Aerosol OT (Sodium salt)	577117
Benzene	71432
Cadmium Chloride	10108642
Cadmium Sulfate	10124364
Cod Liver Oil	8001692
Corn Oil	8001307
Cornstarch	9005258
Cyclosol 63	89072606
1,4-Dioxane	123911
DMF, N,N-Dimethylformamide	68122
DMSO, Dimethyl Sulfoxide	67685
Emulphor	9004982
Ethanol (or Ethyl alcohol - absolute alcohol)	64175
Ether	60297
Ethylene Glycol Monomethyl Ether (2-Methoxyethanol)	109864
Fuel Oil	68476299
2-Ethoxyethanol	110805
HCL, Hydrochloric Acid	7647010
Hexane (also, N-Hexane)	110543
HNO <sub>3</sub> , Nitric Acid (HNO <sub>3</sub> ; H <sub>2</sub> SO <sub>4</sub> ,R)-Purity Character (Sulphuric Acid,R)	7697372
Isopropanol (2-Propanol)	67630
Iron Sulfates	10124499
Methanol (Methyl alcohol) (CH <sub>3</sub> OH)	67561
Methoxyethanol (or 2-Methoxyethanol)	109864
Methylene Chloride	75092
NAHCO <sub>3</sub> , Sodium Bicarbonate	144558
NAOH, Sodium Hydroxide	1310732
N,N-Dimethylformamide (or Dimethylformamide)	68122
Nitric Acid	7697372
Olive Oil	8001250
Peanut Oil	8002037
Pentane	109660
Petroleum ether	8030306
Polyethylene Glycol (2-Propanol)	25322683
Potassium Hydroxide (KOH)	1310583
Propane (Propylene glycol)	57556
2-Propanol Isopropanol (or Isopropanol)-Isopropyl alcohol	67630
Propylene Glycol	57556
Saline	7647145
Salt	7647145
Sodium Chloride (Salt, Saline)(Na Cl)	7647145
Sodium Sulfate	7757826

## ECOTOX Aquatic Coding Guidelines

Soybean Oil .....	8001227
Sulfuric Acid .....	7664939
Sunflower Oil .....	8001216
Tergitol NPX .....	9016459
Toluene (or Methylbenzene) .....	108883
Toxisol FLC .....	12738920
Trichloroacetic Acid .....	76039
Triethylene Glycol .....	112276
Trimethylene Glycol .....	504632
Triton-X100 .....	9002931
Tween 40 .....	9005667
Tween 80 (Polysorbate 80) .....	9005656
Velsicol .....	2307495
Xylene .....	1330207

**APPENDIX E. TEST CONTROL CODES**

<b>C</b>	The control is run concurrent with the exposure tank(s); this includes field studies where the control data are obtained upstream from the exposure data, and controls run in the same system (e.g., lake), but remote from the treatments (e.g., different section of the lake). See also O; note that for concurrent controls the dilution water is the same as for the test exposure.
<b>V</b>	Solvent control reported by author; a duplicate of the exposure tank(s) with the exception that test chemical was not present, but solvent used in stock preparation is present in the control tank.
<b>H</b>	Historical control; results are compared to a control, but the control data were collected previously (i.e., not run simultaneously).
<b>O</b>	“Other” controls are for use in aquatic studies only. The ‘O’ code should be used when a control is run in a different system (defined by different dilution water) than the exposure treatments; ie., control from pond A and effect information from pond B. See also <b>C</b> for concurrent controls.
<b>B</b>	Baseline control; test organism's measurement prior to exposure are used to compare results; mainly used in physiological/biochemical bioassays but includes pretreatment samples in field exposures that were conducted as part of or in preparation of the study.
<b>M</b>	Multiple types of controls were reported by author (e.g., control with dilution water and solvent control).
<b>K</b>	Control was presented but procedure unknown.
<b>NR</b>	Control is not reported by the author.

**APPENDIX F. TEST LOCATION CODES**

<b><u>CODES</u></b>	<b><u>DEFINITIONS</u></b>
<b>FieldA</b>	<b>Field, Artificial</b> - a simulated or artificial field study is conducted outside but under conditions which are lacking in basic parameters such as substrate or tropic components such as plants or organisms, eg. an outdoor cement pond with no substrate and one test species.
<b>FieldN</b>	<b>Field, Natural</b> - a natural field study is conducted outdoors in a natural water body or an artificial water that has a natural bottom substrate and established aquatic communities (e.g. phytoplankton, zooplankton and fish).
<b>FieldU</b>	<b>Field, Unable</b> to determine whether natural or artificial setting
<b>Lab</b>	<b>Laboratory</b> indoor setting
<b>NR</b>	<b>Not Reported</b> ; unable to determine whether laboratory or field

## APPENDIX G. ENDPOINT CODES

CODE	ENDPOINT NAME:	ENDPOINT DEFINITION
BCF	<b>Bioconcentration factor:</b>	<p>A unitless value describing the degree to which a chemical can be concentrated in the tissues of an organism in the aquatic environment. At apparent equilibrium during the uptake phase of a bioconcentration test, the BCF is the concentration of a chemical in one or more tissues of the aquatic organism divided by the average concentration in the water.</p> $BCF = \frac{\text{g/kg chemical in organism tissue}}{\text{g/L chemical in } H_2O}$ <p>or it is calculated from a ratio of rate constants, if at steady state,</p> $BCF = \frac{K1 \text{ (uptake)}}{K2 \text{ (elimination)}}$
BCFD	<b>BCF dry-weight:</b>	Bioconcentration factor derived using dry weight.
EC50	<b>Median Effective Concentration:</b>	Effective concentration for 50% of the organisms tested. If an author reports mortality as the endpoint for an EC50 code, it is coded as an EC50 MOR. Such an endpoint could also be coded as an LC50 by definition but ACQUIRE policy in this case is to respect the author interpretation and definition of an EC50 vs an LC50.
Ecxx	<b>xx% Effective Concentration:</b>	Effective concentration for xx% of tested organisms.
ED50	<b>Median Effective Dose:</b>	Effective dose for 50% of the organisms tested. Used when an effect other than death is the observed endpoint.
ET50	<b>Median Effective Time:</b>	Median time to effect or estimated mean survival time.
ICxx	<b>xx% Inhibition Concentration:</b>	The percentage inhibition concentration is a <b>chronic</b> endpoint "which can be calculated as a point estimate of the concentration that causes a specified degree of effect..." (based on Rand 1995, p.87). Rand provides growth, reproduction or fertilization as effects. Statistically or graphically estimated concentration of test material, under specified concentrations, is expected to cause a xx% inhibition of a biological process for which the data are dichotomous.
IC50	<b>Median Inhibition Concentration:</b>	Statistically or graphically estimated concentration of test material, under specified concentrations, is expected to cause a 50% inhibition of a biological process for which the data are dichotomous.
LC50	<b>Median Lethal Concentration:</b>	Statistically estimated concentration that is expected to be lethal to 50% of a group of organisms tested. Death may be defined by the effect codes MOR, IMM, EQU, HAT. TLms and TL50s with death as the measured endpoint are reported as LC50 and the synonym reported in the

## ECOTOX Aquatic Coding Guidelines

publication is coded in EE\_Remarks.

- LXX **xx% Lethal Concentration/Dose:** A statistically estimated concentration or dose that is expected to be lethal to xx% of a group of organisms.
- LD50 **Median Lethal Dose:** A statistically estimated dose that is expected to be lethal to 50% of a group of organisms.
- LETC **Lethal Threshold Concentration:** Toxicity curve asymptotic concentration indicating an incipient LC50 value. Acute lethal action has essentially ceased.
- LOEC **Lowest Observed Effect Concentration:** Lowest concentration or level (LOEC) that has a statistically significant adverse effect on the tested organisms. The terms MEC (Minimum Effective Concentration) and MTC (Minimum Threshold Concentration, aka Maximal Tolerated Concentration) are coded as LOEC.
- NOTE: "Companion endpoints" are endpoints assigned by the reviewer when the statistical results follow a clear concentration-response pattern and the author reports a NOEC, LOEC or MATC but fails to report the "companion endpoint". For example, when an author reports a NOEC and does not specifically define the lowest statistically significant effective concentration as a "LOEC", the data point is coded as a LOEC in AQUIRE by the reviewer. Similarly for reported LOECs without NOECs, NOEC/ LOECs without MATCs and MATCs without NOEC/LOECs.
- LT50 **Mean Survival Time:** Represents time until death of 50% of the tested organisms. Report the LT50 time in the Exposure Time field. [11/18]
- LTXX **xx% Death Time:** Time until xx% test organisms are dead.
- MATC **Maximum Acceptable Toxicant Concentration:** Hypothetical threshold concentration that is the geometric mean between the NOEC and LOEC concentration. The term Chronic Value (ChV) is encoded as MATC. Refer to companion endpoint note under LOEC definition.
- NOEC **No Observed Effect Concentration:** Highest concentration or level (NOEL) that has no statistically significant adverse effect on the tested organisms. The terms NOLC and NOEL are coded as NOEC. Refer to companion endpoint note under LOEC definition.
- NR-LETH **Lethal:** 100% mortality or 0% survival including algicidal and herbicidal effects. (No statistically derived endpoint reported).
- NR-ZERO **Zero Mortality:** 0% mortality or 100% survival of organisms. (No statistically derived endpoint reported).

## APPENDIX H. EFFECT GROUP CODES AND DEFINITIONS

*Highlighted and italicized indicates that papers or references need to be examined related to that code*

GROUP/EFFECT CODE(S)	DEFINITION
<b>ACC/ACC</b>	<b>Accumulation:</b> Effects, measurements and endpoints which characterize the process by which chemicals are taken into and stored in plants or animals. Includes lethal body burden.
<b>BEH/AVO, BEH, FDB</b>	<b>Behavior:</b> Overt activity of an organism represented by three <i>effect</i> groups - avoidance, general behavior, and feeding behavior. All measurements related to reproductive behavior are listed under the major effect group REP.
<b>BCM/BCM, ENZ, HRM,</b>	<b>Biochemical:</b> measurement of biotransformation or metabolism of chemical compounds, modes of toxic action, and biochemical responses in plants and animals including three <i>effect</i> groups - biochemical, enzyme and hormone effects.
<b>CEL/CEL, GEN, HIS</b>	<b>Cellular Effects:</b> measurements and endpoints regarding changes in structure and chemical composition of cells and tissues of plants or animals as related to their functions; the three <i>effect</i> groups include cellular effects, genetics and histology.
<b>GRO/DVP, GRO, MPH</b>	<b>Growth:</b> a broad category which encompasses measures of weight and length and includes effects on development, egg, growth and morphology. Development covers toxicant effects on tissue organization in growing progeny. Growth represents length and weight changes at any point in the life cycle. Morphology measurements and endpoints address the structure (bones) and form (organ/tissue development) of an organism at any stage of its life history.
<b>MOR/MOR</b>	<b>Mortality:</b> measurements and endpoints where the cause of death is by direct action of the chemical.
<b>PHY/INJ, IMM, ITX, PHY</b>	<b>Physiology:</b> measurements and endpoints regarding basic activity in cells and tissues of plants or animals. Four <i>effect</i> groups include injury, immobilization, intoxication and general physiological response.
<b>POP/POP</b>	<b>Population:</b> measurements and endpoints relating to a group of organisms or plants of the same species occupying the same area at a given time.
<b>REP/ REP, AEG</b>	<b>Reproduction:</b> measurements and endpoints to track the effect of toxicants on the reproductive cycle. All measurements related to reproduction and care of progeny are included in this category, including behavioral and physiological measurements. Measurements related to development of progeny are found under the major <i>effect</i> group GRO, minor <i>effect</i> group DVP. The <i>effect</i> group AEG includes measurements of avian or reptilian eggs.
<b>SYS/PRS</b>	<b>Ecosystem:</b> measurements and endpoints to track the effects of toxicants on ecosystem processes. Includes microbial processes.
<b>NOC/NOC</b>	<b>No Group Code:</b> measurements related to multiple or delayed effects or endpoints reported without a specific effect.

## APPENDIX I. GROUP EFFECT, EFFECT AND MEASUREMENT CODES AND DEFINITIONS

### ACC ACCUMULATION

#### ACC Effect

##### Measurements

BDBN	body burden
ELIM	elimination; general term for loss or disappearance of a substance from an organism by either passive or active transport mechanism, e.g. diffusion and metabolic transformation. (Rand 1995)
LBCN	lethal body concentration
RSDE	residue
UPTK	uptake; the fraction of total available chemical in a medium (food, water) that is transferred to the organism (measured as the incoming - outgoing concentrations) OR a process by which materials are transferred into and onto an organism. (Rand 1995)

### BEH BEHAVIOR

#### AVO Effect

##### Measurements

CHEM	chemical avoidance
FOOD	food avoidance
STIM	stimulus avoidance
WATR	water avoidance

#### BEH Effect

##### Measurements

ACTP	accuracy of learned task, performance	GBHV	behavioral changes, general
ACTV	activity, general	GPRD	production, general
ATCL	antennal cleaning	HONY	honey produced
BBBH	burrow or burial behavior	INST	sleeping time, induced
BWAX	bees wax produced	LOCO	distance moved, change in direct movement
CASE	case leaving behavior	MIGR	migration
COMA	colony maintenance (bees)	NMVM	movements, number of
COMB	comb built	NVOC	vocalizations, number of
DPLY	displaying behavior	PHTR	phototactic response
DRMT	dormant, adverse condition response	PRVU	predator vulnerability
DTCH	ability to detach from substrate	RRSP	righting response
ECMB	empty combs	RSPT	response time to a stimulus
EQU	equilibrium	STRS	observed stress
FLTR	filtration rate	VACL	valve closure
FLYG	flying behavior	THML	temperature tolerance
FRZG	freezing behavior	VCLF	visual cliff

#### FDB Effect

##### Measurements

BGNG	begging behavior	FSTR	food storage
FCNS	food consumption (amount or rate)	FTIM	feeding time
FDNG	feeding behavior (activity)	PRBE	predatory behavior
FECL	fecal production	WCON	water consumption
FEFF	feeding efficiency		

### BCM BIOCHEMICAL

#### BCM Effect

##### Measurements

## ECOTOX Aquatic Coding Guidelines

ALBE	albumen energy	ACHL	nonesterified	PPHT	phosphate
	acetylcholine	FLRS	fluorescence	PHSP	phosphatide phosphorus
ESAA	amino acids, essential	GBCM	biochemical, general	PHOS	phosphorus
AMAC	amino acid(s), general term	GHEM	general hematology	PHSC	phosphatidyl choline (phospholipid) content
TTAA	amino acids, total	GLUC	glucose	PHSE	phosphatidyl ethanolamine (phospholipid) content
TFAA	amino acids, total free	GMIN	glutamine	PHSG	phosphatidyl glycerol (phospholipid) content
NEAA	amino acids, nonessential	GLCN	glycine	PHSI	phosphatidyl inositol (phospholipid)
ACRR	acetylene reduction rate/plant roots nodulated	GLYC	glycogen	PHST	phospholipid content, total
AMMO	ammonia	GLYT	total glycolipid content	PIGM	pigment
ALAN	alanine	HMCT	hematocrit (anemia)	PLAS	plasmolysis
AABA	alpha-aminobutyric acid	HEME	heme content	PORP	porphyrin
ARGI	arginine	HMGL	hemoglobin	POTA	potassium
ASHC	ash content	HIST	histidine	PRCO	<i>protein content</i>
ASPA	aspartate	5HAA	5-hydroxyindole acetic acid	PRSY	protein synthesis
TLBL	bilirubin, total	IBIL	indirect bilirubin (free)	PRTL	<i>protein, total check</i>
	biotin content	IRON	iron	PRTD	protoporphyrin
BICA	biocarbonate	ILEU	isoleucine	PYRV	pyruvate
BUNT	blood urea nitrogen	LACT	lactate	RGSH	<i>reduced glutathione</i>
C9BT	total 9B,19-cyclopropylsterols	LCTA	lactic acid	NPSH	nonprotein sulfhydryl
CALC	calcium	LEAD	<i>lead</i>	RIBO	riboflavin content
CAPH	calcium/phosphorus ratio	LEUC	leucine	RIDX	refractive index
CARB	carbohydrate	LCCT	leucocrit	RBVL	relative blood volume (volume/100g body weight)
CDIO	carbon dioxide	LIPD	lipid	SERI	serine
CARC	carotenoid content	LIPT	lipid content, total	SMET	<i>secondary metabolism</i>
CARO	carotene	LPSA	lipid soluble antioxidants	SRTN	serotonin
CHOL	cholesterol	LYSI	lysine	SODI	sodium
CHLA	chlorophyll 'a' concentration	MCHM	Mean corpuscular (cell) hemoglobin	ST5T	total (delta)5-sterols
CHLB	chlorophyll 'b' concentration	MCHC	mean corpuscular (cell) hemoglobin concentration	ST8T	total (delta)8-sterols
CHLN	choline	MCPV	mean corpuscular (cell) volume	STRH	starch content
CHLO	chlorophyll, general	MTLN	metallothionein	SUGA	sugar content
CHLR	chloride	ME4T	total 4a-methylsterols	TEAM	tetraethyl ammonium
CPRP	coproporphyrin	METH	methionine	THBA	thiobarbituric acid
CREA	creatinine	MCPR	microsomal proteins	THRE	threonine
CUCO	copper	MGCO	magnesium	TRIB	tributyrin
CYB5	cytochrome B-5	MGDG	monogalactosyl diglyceride (glycolipid) content	TRIG	triglycerides
CP1A	cytochrome P1A	MNCO	manganese	TRYP	tryptophan
P450	cytochrome P-450	NADP	nicotinamide-adenine dinucleotide phosphate, <i>reduced</i>	TYRO	tyrosine
D44T	<i>total 4,4 dimethylsterols</i>	NCON	nitrogen	UREA	urea
DGDG	digalactosyl diglyceride (glycolipid)	NRGC	<i>energy compound</i>	URIC	uric acid
DI4T	<i>total 4-dimethylsterols</i>	NUTR	nutrient status change	VALI	valine
DISC	diethylsuccinate hydrolysis	ORNI	ornithine	VTD3	vitamin D3
DTBL	direct bilirubin (conjugated)	PCLV	<i>packed cell volume</i>	YLKE	<i>yolk energy</i>
ETHL	ethylene	AMNH	p-amino hippurate	ZNCO	Zinc content
FFTA	fatty acids, free or	PHPH	pH		
		PHEN	phenylalanine		

## ENZ Effect

### Measurements

2OHB	2-OH biphenyl hydroxylase	ALAD	(delta) $\Delta$ -aminolevulinic acid dehydrogenase
4OHB	4-OH biphenyl hydroxylase	ALDO	aldolase
ACHE	acetylcholinesterase	ALPH	alkaline phosphatase
ACPH	acid phosphatase	ALAS	(gamma) $\gamma$ -ALA synthetase
AEPX	aldrin epoxidase	AATT	alanine aminotransferase
AHDX	aniline hydroxylase	ATRP	alanine transpeptidase

## ECOTOX Aquatic Coding Guidelines

APND	aminopyrine n-demethylase	GOTR	glutamic-oxaloacetic transaminase
AHHD	aryl hydrocarbon hydrolase	GPTR	glutamic pyruvic transaminase
ASAT	aspartate aminotransferase	GLPX	glutathione peroxidase
BCHE	buterylcholinesterase	GSTR	glutathione S-transferase
BCOD	butoxycoumarin O-dealkylase	GLRE	glutathione reductase
BAPH	benzo(a)pyrene hydroxylase	HXBH	hexobarbital hydroxylase
BPND	benzphetamine-n-demethylase	LADH	lactate dehydrogenase
BGAL	(beta) $\beta$ -galactosidase	LDMD	lactate dehydrogenase/malic dehydrogenase ratio
BHXA	benzpyrene hydroxylase	MADH	malic dehydrogenase
BROD	benzylresorufin O-deethylase	MCOD	methoxycoumarin O-dealkylase
CATP	calcium ATPase	MG6P	microsomal glucose 6-phosphatase
CAAH	carbonic anhydrase	MAOA	mono amino oxidase
CACA	choline acetyltransferase	PNAD	p-nitroaniline demethylase
CEST	cholinesterase	ANAE	$\alpha$ -naphthyl acetate esterase
CRKI	creatine kinase	NCCR	NADPH cytochrome C reductase
CCOX	cytochrome C-oxidase	450R	NADPH-cytochrome p-450 reductase
EPHY	epoxide hydrase	DHYD	NADPH dehydrogenase
ECOD	ethoxycoumarin O-deethylase	ORCT	ornithine carbamoyl transferase
EROD	7-ethoxyresorufin O-deethylase	PBHD	pentobarbital hydroxylase
ESTE	esterase	PROD	pentylresorufin O-deethylase
FDPA	fructose-diphosphate aldolase	PBES	phenyl benzoate esterase
GENZ	enzyme, general	PCOD	propoxycoumarin O-dealkylase
GGTR	(gamma) $\gamma$ -glutamyl transferase <sup>1</sup>	SGOT	serum glutamate oxalo acetate transaminase
G6PD	glucose-6-phosphate dehydrogenase	SGPT	serum glutamic pyruvic transaminase
GLTR	glucuronyl transferase	NKAT	sodium potassium ATPase
GLUR	(beta) $\beta$ -glucuronidase	SBDH	sorbitol dehydrogenase
GLAD	glutamic acid dehydrogenase	SCDH	succinate dehydrogenase
		SODA	SOD enzyme activity
		THTR	thiol transferase
		TRIE	triacetin esterase

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<sup>1</sup> GGT is also used for gamma glutamyl transpeptidase, a liver enzyme; prior to using the GGTR code verify that indeed GGT is used as the transferase in the current publication. A new code will be needed for the transpeptidase.

## ECOTOX Aquatic Coding Guidelines

### HRM Effect

#### Measurements

ABSA	abscisic acid
ANDR	androgen
AUXN	auxin
CORT	corticosterone
CYTK	cytokinin
DOPA	dopamine
EPIN	epinephrine
ESDL	17-beta estradiol

ESTR	estrogen
GHRM	hormone, general changes in
GIBB	gibberellin
NORE	norepinephrine
PRGS	progesterone
THYR	thyroxine
TRII	triiodothyronine
TSTR	testosterone

### GRO GROWTH<sup>2</sup>

#### DVP Effect

##### Measurements

ABNM	abnormal
COLR	color
DFRM	deformation
EMRG	emergence
FIRM	firmness
FLDG	fledged/female or /brood
GDVP	development, general
MATR	maturation

MOLT	molting
PHRV	post harvest character influenced
PUPA	pupation
SXDP	sexual development
TERA	teratogenesis
WEAN	weaned

#### GRO Effect

##### Measurements

ABNM	abnormal
AREA	area
BMAS	biomass
CVER	cover
GGRO	growth, general
GGRT	growth rate index

HGHT	height
LGTH	length
NNOD	dry mass/plant roots not nodulated
NODE	# nodules/nodulated plant roots
RGNR	limb/ body part regeneration
SIZE	size
STNT	stunting
WGHT	weight

#### MPH Effect

##### Measurements

COSC	caudal ossification center
DEPO	shell deposition
GMPH	general morphological changes
LGTH	length
MOSC	metacarpal ossification center
SMIX	organ weight in relationship to body weight
SOSC	sternal ossification center
SRIB	supernumerary ribs
STRC	structural changes
STTO	strength and tone
WGHT	weight

---

<sup>2</sup> For generational effects, ie. F1 exposed, measurements from F2, F3, etc., use 'J' to precede juvenile measurement codes, 'E' to precede embryo measurement codes

# ECOTOX Aquatic Coding Guidelines

## CEL CELLULAR EFFECTS

### CEL Effect 4/17/99

#### Measurements

BASO basophil  
CCHG cell changes  
CYTO cytotoxicity  
DIVC dividing cells  
EOSN eosinophil  
ERTH erythoroblasts  
GRAN granulocyte  
LEUK leukocytes  
LMPH lymphocyte  
MONO monocyte

NCEL number of cells  
NEUT neutrophil  
ORGL organelle  
RBCE red blood cell  
RETI reticulocytes  
SPLO splenocytes  
STRC structural changes  
THRM thrombocytes  
TWBC white blood cell count, total  
UBWB white blood cell, undifferentiated blasts

### GEN Effect

#### Measurements

CHLM chlorophyll mutation/albino mutants  
DAMG damage  
DNAC DNA concentration  
DNAS DNA synthesis rate  
MEIA meiotic abnormalities, general  
ME1A meiotic abnormalities, 1<sup>st</sup> anaphase  
ME1M meiotic abnormalities, 1<sup>st</sup> metaphase  
ME2A meiotic abnormalities, 2<sup>nd</sup> anaphase  
ME2M meiotic abnormalities, 2<sup>nd</sup> metaphase  
MEDM meiotic abnormalities, diakinesis and 1<sup>st</sup> metaphase  
MEIR meiosis rate  
MITA mitotic abnormalities, general  
MICL mitotic abnormalities, clumping  
MIAT mitotic abnormalities, ana-telophase  
MIBC mitotic abnormalities, binucleate cell  
MIBG mitotic abnormalities, bridge  
MICY mitotic abnormalities, cytomixis  
MIPO mitotic abnormalities, disturbed polarity

MIES mitotic abnormalities, early separation  
MIEX mitotic abnormalities, exclusion  
MIFR mitotic abnormalities, fragment  
MIIN mitotic abnormalities, interphase cells  
MILG mitotic abnormalities, laggard  
MIMT mitotic abnormalities, metaphase  
MIMN mitotic abnormalities, micronuclei  
MINB mitotic abnormalities, nuclear budding  
MINF mitotic abnormalities, nuclear fusion  
MIPR mitotic abnormalities, prophase  
MISK mitotic abnormalities, stickiness  
MITI mitotic index (#mitoses/total cells)  
MITR mitotic rate  
MNUC micronuclei increase  
MUTA mutation  
NABN nuclear abnormalities  
RNAC RNA concentration  
RNAS RNA synthesis rate  
SEXE sex expression change

### HIS Effect

#### Measurements

ARTS arteriosclerosis  
CTYP percent cell type  
EDMA edema  
GHIS histological changes, general  
GLSN gross lesions  
HEMR hemorrhage

HYPL hyperplasia  
NCRL necrotic lesions  
NCRO necrosis  
NPHR nephrosis  
TFLR *tissue fluorescence in UV light* (BCM FLRS)  
USTR ultrastructural changes

## MOR MORTALITY OR SURVIVORSHIP<sup>3</sup>

### MOR Effect

#### Measurements

HTCH hatch

MDTH mean time of death

<sup>3</sup> Ditto.

## ECOTOX Aquatic Coding Guidelines

MORT	mortality
SURV	survival
TDTH	time to death
TKNO	knockdown

### PHY PHYSIOLOGICAL

ASHG	anti-sheep red blood cell hemagglutinin
DHYP	delayed type hypersensitivity
LYMP	lymphocyte activity
NKCA	natural killer cell activity

### INJ Effect Measurements

CLRS	chlorosis
CURV	curvature
DAMG	damage
DESI	desiccation

### ITX Effect

#### Measurements

ANOR	anorexia
ATAX	ataxia
CONV	convulsions
GITX	intoxication, general

### PHY Effect

#### Measurements

ABSC	abscission
ADPO	oxidative phosphorylation
ANBC	aniline binding capability
ASML	assimilation efficiency
BDVL	blood volume
BTMP	body temperature
COLD	cold hardiness
DORB	dormancy break
DORI	dormancy induction
EECG	electroencephalogram
EXCR	excretion rate
GPHY	physiology, general
HTRT	heart rate
HYDR	hydration
IOUP	ion uptake
IRRI	irritation
MYCO	mycorrhizal colonization
NAST	nastic movements
NFIX	nitrogen fixation
NPRA	net photosynthetic rate
NRSP	neuroresponse
OSMO	osmolality

### IMM Effect Measurements

PARA	amount or percent animals infested with parasites
THYM	thymocyte activity

GINJ	injury, general
SYMP	symptom severity index
TUMR	tumor induction
VASC	vascular disruption

IMBL	immobile,
INCO	incoordination
PARL	paralysis
TINT	time to signs of intoxication

OSRS	osmotic resistance/ RBC
OXYG	oxygen consumption
PRIN	PR intervals
<i>PSII</i>	<i>photosystem II (PSII) electron transport activity</i>
PSYN	photosynthesis
RESP	respiration
RPRT	respiratory rate
SENE	senescence
SENI	senescence induced/accelerated
SENR	senescence retarded
SRLO	spectral reflectance/shift to longer wavelengths
SRSR	spectral reflectance/shift to shorter wavelengths
STOM	stomatal aperture
SWEL	swelling
TEXT	texture change
THRG	thermoregulation
TRAN	transpiration
WACN	<i>water content</i>
WILT	wilt

### POP POPULATION

### POP Effect

#### Measurements

ABND	Abundance (number of animals/area ; density)
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BMAS	biomass
DRFT	drift

## ECOTOX Aquatic Coding Guidelines

DVRS	diversity
INDX	index to population size; count, number, abundance
NCHG	population change (change in n/change in time)
PBRA	biomass turnover ratio (population/biomass)
PCCP	population carrying capacity
PGRT	population growth rate (intrinsic rate

	of increase)
RCLN	colonization rate
RCPR	recapture ratio
SEXR	sex ratio
TRAP	trappability

### REP REPRODUCTION

#### REP Effect

##### Measurements

ABNM	abnormal
BNDG	pair bonding nesting behavior
COUR	courtship behavior
CYNG	care of young, nest attentiveness
EGPN	eggs per nest
FERT	fertility
FLOR	floral induction
FRMS	frames, bees
FRUH	percent fruit harvested
GERM	germination
GIDX	gestation index
GSTT	gestation time
INFL	inflorescence
LACG	lactating
NANT	nests abandoned
NCLU	corpus lutea, number of
NDAY	number of days between eggs laid
NEGI	number of eggs incubated
NINC	number of nests incubated
NOPN	number of organisms per nest
NPOD	number of pods
NSTA	number of active nests
NSTI	nest initiation

NSNT	successful nests
NSTS	number of nests produced
NTSZ	nest size
NUNT	unsuccessful nests
OBRD	open brood
OEGP	onset of egg production
OVRT	ovulation rate
PIPD	pipped
PLBR	pairs with litter or brood
PRFM	pregnant females in a population
PROG	progeny counts/numbers
PRTH	parthenocarp
RBEH	reproductive behavior changes
RPRD	reproductive capacity
RSUC	reproductive success (general)
RSEM	resorbed embryos
SBRD	sealed brood
SEED	seed characteristics (including mass, number, set, yield)
SPCL	sperm cell counts
STRL	sterility
TPRD	total production
VIAB	viable offspring/seed

#### AEG Effect

##### Measurements

CRAK	cracking
ESIN	eggshell index
LGTH	length
QUAL	quality
SHLL	shell, percent
SIZE	size
SOFT	softness
THIK	thickness
VIAB	viable

VOLU	volume
WDTH	width
WGHT	weight
YOLK	yolk, percent

### SYS ECOSYSTEM

#### PRS Effect

##### Measurements

BGCM	biogeochemical
CO2P	CO <sub>2</sub> evolution
DCMP	decomposition
GPPR	gross primary productivity/respiration

NITR	nitrification
NMIN	net mineralization
PPRO	primary productivity
SPRO	secondary productivity

## ECOTOX Aquatic Coding Guidelines

SRES system respiration  
TROP efficiency of trophic transfer between

different levels in the food chain;  
assimilation efficiency

**NOC No GROUP CODE**

### **NOC Effect**

#### **Measurements**

MULT multiple effects reported as one  
result  
NRNR endpoint reported without a specific  
effect  
XXXX delayed effect

**APPENDIX 11. SOME STANDARD  
BIOCHEMICAL VARIABLE ABBREVIATIONS**

ACHL	acetylcholine	EOSN	eosinophil	OSRS	osmotic resistance/RBC
ATPH	adenosine 5'-triphosphate (10/6/99-dp)	ERTH	erythroblasts	PCLV	packed cell volume
ALAN	alanine	FFTA	fatty acids, free	AMNH	p-amino hippurate
ALBE	albumen energy	NEFA	fatty acids, nonesterified	PHPH	pH
AABA	alpha-aminobutyric acid	GHEM	general hematology	PHEN	phenylalanine
ESAA	amino acids, essential: THR, VAL, MET, ILE, LEU, PHE, LYS, TRP, HIS, ARG	GLUC	glucose	PPHT	phosphate
AMAC	amino acid(s), general term	GMIN	glutamine	PHSP	phosphatide phosphorus
NEAA	amino acids, nonessential: ASP, SER, ASN, AAB, TYR, ORN, ALA, GLY, GLU, GLN, PRO, CYS	GLCN	glycine	PHOS	phosphorus
TTAA	amino acids, total	GLYC	glycogen	PORP	porphyrin
TFAA	amino acids, total free	GRAN	granulocyte	POTA	potassium
AMMO	ammonia	HMCT	hematocrit (anemia)	TOPR	protein, total
ANBC	aniline binding capability	HEME	heme content	PRTO	protoporphyrin
ARGI	arginine	HMGL	hemoglobin	PYRV	pyruvate
ASHC	ash content	HIST	histidine	RGSH	reduced glutathione
ASPA	aspartate	5HAA	5-hydroxyindole acetic acid	NPSH	nonprotein sulfhydryl
BASO	basophil	IBIL	indirect bilirubin (free)	RBCE	red blood cell
TLBL	bilirubin, total	IRON	iron content	RIDX	refractive index
BIOT	biotin content	ILEU	isoleucine	RBVL	relative blood volume (volume/100g body weight)
BUNT	blood urea nitrogen	NEUT	neutrophil	RETI	reticulocytes
BDVL	blood volume	LACT	lactate	SERI	serine
CALC	calcium	LCTA	lactic acid	SRTN	serotonin
CAPH	calcium/phosphorus ratio	LEAD	lead	SODI	sodium
CARB	carbohydrate	LEUC	leucine	SPLO	splenocytes
CCHG	cell changes	LCCT	leucocrit	STER	sterols, general
CHOL	cholesterol	LEUK	leukocytes	TEAM	tetraethyl ammonium
CHLN	choline	LIPD	lipid	THBA	thiobarbituric acid
CHLR	chloride	LPSA	lipid soluble antioxidants	THIO	thiol
CPRP	coproporphyrin	LMPH	lymphocyte	THRE	threonine
CREA	creatinine	LYSI	lysine	THRM	thrombocytes
CYB5	cytochrome B-5	MCHC	mean corpuscular hemoglobin concentration	TRIB	tributyrin
CP1A	cytochrome P1A	MCPV	mean corpuscular volume	TRIG	triglycerides
P450	cytochrome P-450	MT	metallothionein	TRYP	tryptophan
DISC	diethylsuccinate hydrolysis	MHEM	methemoglobin	TYRO	tyrosine
DTBL	direct bilirubin, conjugated	METH	methionine	UREA	urea
DOPA	dopamine	MCPR	microsomal proteins	URIC	uric acid
		MONO	monocyte	UROP	uroporphyrin
		NADP	nicotinamide-adenine dinucleotide phosphate, reduced	VALI	valine
		ORNI	ornithine	VTD3	vitamin D3
				UBWB	white blood cell, undifferentiated blasts
				TWBC	white blood cell count, total
				YLKE	yolk energy

## APPENDIX I2. SOME STANDARD ENZYME ABBREVIATIONS

2OHB	2-OH biphenyl hydroxylase	GLTR	glucuronyl transferase
4OHB	4-OH biphenyl hydroxylase	GLUR	(beta) $\beta$ -glucuronidase
ACHE	acetylcholinesterase	GLAD	glutamic acid dehydrogenase
ACPH	acid phosphatase	GOTR	glutamic-oxaloacetic transaminase
AEPX	aldrin epoxidase	GPTR	glutamic pyruvic transaminase
AHDX	aniline hydroxylase	GLPX	glutathione peroxidase
ALAD	(delta) $\Delta$ -aminolevulinic acid dehydrogenase	GSTR	glutathione S-transferase
ALDO	aldolase	GLRE	glutathione reductase
ALPH	alkaline phosphatase	HXBH	hexobarbital hydroxylase
ALAS	(gamma) $\gamma$ -ALA synthetase	LADH	lactate dehydrogenase
AATT	alanine aminotransferase	LDMD	lactate dehydrogenase/malic dehydrogenase ratio
ATRP	alanine transpeptidase	MADH	malic dehydrogenase
APND	aminopyrine n-demethylase	MNSD	(alpha) $\alpha$ -mannidose [1/4/99]
AHHD	aryl hydrocarbon hydrolase	MTDH	mannitol dehydrogenase [1/4/99]
ASAT	aspartate aminotransferase	MCOD	methoxycoumarin O-dealkylase
BAPH	benzo(a)pyrene hydroxylase; aryl hydrocarbon hydroxylase (AHH)	MG6P	microsomal glucose 6-phosphatase
BPMO	benzopyrene monooxygenase	MAOA	mono amino oxidase
BPND	benzphetamine-n-demethylase	PNAD	p-nitroaniline demethylase
BHXA	benzpyrene hydroxylase	ANAE	$\alpha$ -naphthyl acetate esterase
BROD	benzylresorufin O-deethylase	NFCR	NADH ferricyanide reductase
BCHE	butyrylcholinesterase	NACR	NADH cytochrome C reductase
BCOD	butoxycoumarin O-dealkylase	NCCR	NADPH cytochrome C reductase
CASE	calcium ATPase	450R	NADPH-cytochrome p-450 reductase
CAAH	carbonic anhydrase	DHYD	NADPH dehydrogenase
CACA	choline acetyltransferase	ORCT	ornithine carbamoyl transferase
CEST	cholinesterase	PBHD	pentobarbital hydroxylase
CRKI	creatine kinase	PROD	pentylresorufin O-deethylase
CCOX	cytochrome C-oxidase	PZMS	phenazine methosulfate [1/4/99]
EPHY	epoxide hydrolase	PBES	phenyl benzoate esterase
ECOD	ethoxycoumarin O-deethylase	PCOD	propoxycoumarin O-dealkylase
EROD	7-ethoxyresorufin O-deethylase	SGOT	serum glutamate oxaloacetate transaminase
ESTE	esterase	SGPT	serum glutamic pyruvic transaminase
FDPA	fructose-diphosphate aldolase	NKAT	sodium potassium ATPase
GGTR	(gamma) $\gamma$ -glutamyl transferase <sup>4</sup>	SBDH	sorbitol dehydrogenase
G6PD	glucose-6-phosphate dehydrogenase	SCDH	succinate dehydrogenase
		THTR	thiol transferase
		TREH	trehalase [1/4/99]
		TRIE	triacetin esterase
		TRPS	trypsin

<sup>4</sup> GGT is also used for gamma glutamyl transpeptidase, a liver enzyme; prior to using the GGTR code verify that indeed GGT is used as the transferase in the current publication. A new code will be needed for the transpeptidase.

**APPENDIX I3. SOME STANDARD HORMONE ABBREVIATIONS**

ANDR androgen  
ESDL 17-beta estradiol  
CORT corticosterone  
EPIN epinephrine  
ESTR estrogen  
HRMN hormone, changes in

NORE norepinephrine  
PRGS progesterone  
TSTR testosterone  
THYR thyroxine (T4)  
TRII triiodothyronine (T3)  
VTGN vitellogenin

**APPENDIX J. ECOTOX TISSUE CODES**

AG	Accessory Gland	GI	Gills
AM	Adductor Muscle	GP	Gills + Palps
AD	Adipose Tissue	GZ	Gizzard
AR	Adrenal Gland	GO	Gonads
AS	Air Sac	GG	Green Gland
AL	Albumen (egg white)	GU	Gut
AT	Alimentary Tract	HA	Hair
AF	Amniotic Fluid	HD	Head
AP	Appendages	HE	Heart
BB	Backbone, Spine	HL	Hemolymph
BW	Bee's Wax	HP	Hepatopancreas
BI	Bile	HO	Honey
BL	Blood	HM	Humerus
BV	Blood vessel	HY	Hypothalamus
BO	Bone	IN	Intestines (Intestinal Tract)
BM	Bone Marrow	IR	Interrenal (organ between kidneys, interrenal body; found in many fishes)
BR	Brain	KI	Kidney
BT	Breast	LP	Labial Palps
BC	Buccal mass	LD	Lipid, Fat
BU	Bursa	LE	Leaf
BY	Byssus	LG	Leg
CP	Capat	LI	Liver
CA	Cartilage	LU	Lungs
CH	Chord, spinal	MM	Mammary Tissue
CL	Claw	MA	Mantle
CG	Cloacal gland	MS	Mesenteric Lymph Node
CO	Collagen	MC	Microsome
CR	Crop	MI	Midgut and Midgut Gland
DG	Digestive Gland	MK	Milk, lactating females
DT	Digestive Tract	MO	Mucous
ET	Edible Tissue	MT	Multiple Tissue/Organs
EG	Egg	MU	Muscle
EU	Egg Cuticle	MB	Muscle + Bone
EL	Elytrum	NG	Nasal Gland
EM	Embryo	NK	Neck
EN	Entrails	NE	Nervous Tissue
ER	Erythrocyte	NR	Not Reported
ES	Esophagus	OL	Olfactory
EC	Excreta	OV	Ovaries
EX	Exoskeleton	OD	Oviduct
EY	Eye	PA	Palps
FE	Feathers	PS	Pancreas
FC	Feces	PE	Penis
FM	Femur	PI	Pituitary Gland
FL	Fillet	PC	Placenta
FI	Fin	PL	Plasma
FL	Fillet	PO	Pollen
FH	Flesh	PG	Prostrate Gland
FO	Foot	PR	Proventriculus
FD	Fron	PN	Pronephros (vestigial kidney)
FR	Fry	PD	Pseudobranch
GB	Gall Bladder	RC	Rectum
GT	Gastrointestinal Tract		

## ECOTOX Aquatic Coding Guidelines

RT	Reproductive Tissue
RR	Residual, Remnants, Carcass
RM	Retractor Muscle
RO	Root
SA	Salt Gland
SC	Scale
SV	Seminal Vesicle
SE	Sensory Organs
SR	Serum
SL	Shell (mollusc, egg, ...)
SG	Shell Gland
SB	Shell, Membrane
SO	Shoot
SI	Siphon
SN	Skeleton
SK	Skin, Epidermis
SM	Sperm
SP	Spleen
SS	Stem
SH	Stomach
ST	Soft Tissue
SX	Submaxillary Gland
SW	Swimbladder
TA	Tail
TN	Tentacles
TE	Testes
TG	Thigh muscle
TH	Thorax
TB	Tibia
TI	Tissue
TS	Thymus
TY	Thyroid
UB	Urinary Bladder
UR	Urine
UG	Uropygial Gland
UT	Uterus
VD	Vas Deferens
VE	Vertebra
VI	Viscera
WI	Wings
WO	Whole Organism
YO	Yolk

**APPENDIX K. KEYWORDS FOR REMARKS TEXT FIELDS**

**Chemical**

Effluent  
Humic Acid  
Oil Mixture  
Mixture

**EE Remarks**

Safe Conc (Safe Concentration)

**General**

Acute  
Diet  
Field  
Food Chain  
Graphical Data  
Pre-Exposure  
QSAR  
Recovery  
Sediment  
Sublethal  
Toxicity Symptoms<sup>5</sup>  
Transport

**Growth/Development**

Diet  
Malformation  
Molt

**Organism**

Bacteria  
Ind Taxon Result  
(individual taxonomic results reported)  
Microtox  
Sex  
Size  
Terrestrial

**Organism Characteristics**

CW carapace width  
Wet wt wet weight

**Other Effects**

Genotoxicity threshold

**Physiology**

Antibodies  
Diet  
Hormone  
Metallothionen  
Nutrient  
Parasitism  
Parturition  
Stress

**Residue**

Autoradiography  
Biotransformation  
Clearance  
Depuration  
Distribution  
Elimination  
Kinetics  
Lethal Body Burden  
Metabolism  
Radiolabel  
Uptake

**Water Characteristics**

Alkalinity  
Conductivity  
D.O.  
Hardness  
Hypoxia  
Org\_C  
pH  
Salinity  
Temperature  
Water Soluble Concentrate

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<sup>5</sup> "Toxicity symptoms" as a key word is defined as erratic swimming, loss of reflex, discoloration, changes in behavior, excessive mucus production, hyperventilation, opaque eyes, curved spine, hemorrhaging, molting and cannibalism (APHA et al., 1992).

**APPENDIX L. CONCENTRATION UNITS**

for dose conc and application rate; for application rate AI may precede any units

Bq	Becquerels	ug/cm2/d	micrograms per centimeter squared
Bq/g	Becquerels per gram		per day
Bq/kg	Becquerels per kilogram	ug/d	micrograms per day
Bq/L	Becquerels per liter	ug/d/org	micrograms per day per organism
Bq/mg	Becquerels per milligram	ug/egg	micrograms per egg
Bq/ml	Becquerels per milliliter	ug/fish	micrograms per fish
cpm	counts per minute	ug/g	micrograms per gram
cpm/L	counts per minute per liter	ug/g/d	micrograms per gram per day
cpm/mg	counts per minute per milligram	ug/kg	micrograms per kilogram
cc N/50soln	cubic centimeters 50N solution	ug/kg LD	micrograms per kilogram lipid
Ci/L	Curies per liter	ug/kg/d	micrograms per kilogram per day
Ci/mol	Curies per mole	ug/L	micrograms per liter
dpm	disintegrations per minute	ug/L/d	micrograms per liter per day
dpm/mg	disintegrations per minute per milligram	ug/ul	micrograms per microliter
dpm/ml	disintegrations per minute per milliliter	ug/mg	micrograms per milligram
gal/acre	gallons per acre	ug/ml	micrograms per milliliter
g	grams	ug/org	micrograms per organism
g/m3	grams per cubic meter	ug/tank/wk	micrograms per tank per week
g/ft2	grams per foot squared	ul	microliter
g/fish	grams per fish	ul/100ml	microliters per 100 milliliters
g/4m2	grams per four square meters	ul/20ml	microliters per 20 milliliters
g/ha	grams per hectare	ul/cm2	microliters per centimeter squared
g/kg	grams per kilogram	ul/egg	microliters per egg
g/L	grams per liter	ul/g	microliters per gram
g/m2	grams per meter squared	ul/kg	microliters per kilogram
g/ug	grams per microgram	ul/L	microliters per liter
g/m2	grams per square meter	ul/ml	microliters per milliliter
g/yr	grams per year	ul/org	microliters per organism
IU	International Units	uM	microMolar (micromoles per liter)
jv	juveniles	uM/L	microMolar/liter
jv/fm	juveniles per female	uM/kg	microMolar per kilogram
jv/mated fm	juveniles per mated female	uM/L	microMolar per liter
kBq/dm3	kiloBecquerels per cubic decimeter	umol	micromoles
kBq/L	kiloBecquerels per liter	umol/100 g	micromoles per 100 grams
kBq/ml	kiloBecquerels per milliliter	umol/dm3	micromoles per cubic decimeter
kg	kilograms	umol/kg	micromoles per kilogram
kg/ha	kilograms per hectare	umol/L	micromoles per liter
kg/L	kilograms per liter	mBq	milliBecquerels
kg/m3	kilograms per cubic meter	mBq/ml	milliBecquerels per milliliter
L/ha	liters per hectare	mCi	milliCuries
L/mi	liters per mile	mCi/mg	milliCuries per milligram
uBq	micro Becquerels	mCi/ml	milliCuries per milliliter
uCi	microCuries	mCi/mmol	milliCuries per millimole
uCi/3.6mg	microCuries per 3.6 milligrams	meq/L	milliequivalents per liter
uCi/30mg	microCuries per 30 milligrams	mg	milligrams
uCi/kg	microCuries per kilogram	mg/ae/L	milligrams acid equivalent per liter
uCi/L	microCuries per liter	mg/100g	milligrams per 100 grams
uCi/ul	microCuries per microliter	mg/70g	milligrams per 70 grams
uCi/mg	microCuries per milligram	mg/dm3	milligrams per cubic decimeter
uCi/ml	microCuries per milliliter	mg/d	milligrams per day
uCi/org	microCuries per organism	mg/dose	milligrams per dose
ueq/g	microequivalents per gram	mg/fish	milligrams per fish
ueq/L	microequivalents per liter	mg/g	milligrams per gram
ug	micrograms	mg/g/d	milligrams per gram per day
ug/100g	micrograms per 100 grams	mg/g clay	milligrams per gram clay
ug/100g/d	micrograms per 100 grams per day	mg/kg	milligrams per kilogram
ug/50ul	micrograms per 50 microliters	mg/kg diet	milligrams per kilogram diet
ug/cell	micrograms per cell	mg/kg/L	milligrams per kilograms per liter
ug/cm2	micrograms per centimeter squared	mg/kg/fish	milligrams per kilogram per fish
		mg/kg/d	milligrams per kilogram per day

## ECOTOX Aquatic Coding Guidelines

mg/kg/wk	milligrams per kilogram per week	ng/mg	nanograms per milligram
mg/L	milligrams per liter	nM	nanoMolar (nanomoles per liter)
mg/ml	milligrams per milliliter	nM/g	nanoMolar per gram
mg/org	milligrams per organism	nmol	nanomoles
ml	milliliters	nmol/kg	nanomoles per kilogram
ml/100g	milliliters per 100 grams	nmol/L	nanomoles per liter
ml/body/wt	milliliters per body weight	nmol/ml	nanomoles per milliliter
ml/kg	milliliters per kilogram	N	Normal (equivalents per liter)
ml/L	milliliters per liter	oz/acre	ounces per acre
ml/m <sup>2</sup>	milliliters per square meter	ppm/org	parts per million per organism
mM	milliMolar (millimoles per liter)	%	percent
mmol	millimoles	% g	percent grams
mmol/m <sup>3</sup>	millimoles per cubic meter	% mg	percent milligrams
mmol/kg	millimoles per kilogram	% sat	percent saturation
mmol/L	millimoles per liter	% v/v	percent volume per volume
M	Molar (moles per liter)	g/100 v/v	parts per thousand volume per volume
molal	Molality	PI g/L	PI (π) grams per liter
mol	moles	pCi/L	picoCuries per liter
mol/m <sup>3</sup>	moles per cubic meter	pCi/ml	picoCuries per milliliter
mol/L	moles per liter	pg/g	picograms per gram
mol/org	moles per organism	pmol/L	picomoles per liter
nCi	nanoCuries	pmol/ml	picomoles per milliliter
nCi/L	nanoCuries per liter	lb/acre	pounds per acre
ng	nanograms	lb/cwt sd	pounds per hundred weight seed
ng/cm <sup>2</sup>	nanograms per square centimeter	T/km <sup>3</sup>	tons per cubic kilometer
ng/fish	nanograms/fish	v/v	volume per volume
ng/org	nanograms/organism		
ng/g	nanograms per gram		
ng/g	nanograms per gram diet		

## APPENDIX M. EXPOSURE TYPE CODES

### Lab Exposure Types

- C** - Topical exposure
- D** - Diet or Oral exposure (includes simultaneous diet and water exposure)
- F** - Flow-through
- I** - Injection
- L** - Leaching (used for leachate and sediment exposures, if water conc reported)
- P** - Pulse (intermittent or fluctuating dosing)
- R** - Renewal
- S** - Static (recirculating exposures are noted in Exp Design; algae tests where the time is < 24 hr, static may be assumed, and coded as such by the reviewer)

### Field Exposure Types

- B** - Tidal
- D** - Diet
- E** - Lentic (static water system without measurable flow rate, e.g., ponds, lakes, troughs, irrigation ditches - dp 9/28/99)
- I** - Injection
- O** - Lotic (flowing water system, e.g., streams)

**APPENDIX N. ACQUIRE DATA FIELD ABBREVIATIONS**

<b>Field Heading</b>	<b>Remark Abbreviation</b>
Grade	GRADE
Characteristics	CHAR
Radiolabel	RADIO
Carrier or Solvent	CARRIER
Solvent Characteristics	SOLVCHAR
Media	FW,SW
Location	LAB,FIELD
Organism Char	LIFESTG
Control	CONTR
Tissue	TISSUE
Effect	In EE_Remark
Trend	TREND
Endpt	In EE-Remark
Signif	SIGNIF
Level	LEVEL
Concentration	CONC
BCF	BCF
Exposure Time	TIME
Exposure Type	TYPE
Method Conc	CONC
Temperature	TEMP
Hardness	HARD
Alkalinity	ALK
Dissolved Oxygen	DO
pH	PH
Salinity	SALIN
Conductivity	COND
Organic C	ORG C

## ECOTOX Aquatic Coding Guidelines

Field Heading	Remark Abbreviation
Habitat Descr	HAB
Substrate Info	SUBSTR
Water Depth	DEPTH
Location	LOC
Sta/Pro/Country	None
Latitude	LAT
Longitude	LONG
AP Type	AP TY
AP Frequency	AP FREQ
AP Rate	AP RATE
Half Life	HALF
AP Season	AP SEAS
AP Date	AP DATE

## APPENDIX O. HABITAT CODES<sup>6</sup> AND COMMON DESCRIPTORS

**Estuarine** - “deepwater tidal habitats ... with sporadic access to open ocean... ocean water is ... diluted by freshwater...”; Salinity range between 0.5 (20 acres) and <=2 m water depth, for example: < 30 ppt, for example:

Bay  
Marsh, brackish, salt, tidal  
Estuary  
Sw amp

**Lacustrine** - “permanently flooded lakes and reservoirs, intermittent lakes and tidal lakes with salinity <=0.5 ppt; ”; total area exceeds 8 ha (20 acres) and 2 m water depth, for example:

Bay  
Cove  
Impoundment  
Lake

**Marine** - “open ocean overlying the continental shelf and its associated ... coastline; includes shallow coastal indentations or bays; salinity [typically] exceed 30 ppt”; for example:

Bay  
Gulf  
Open ocean  
Reef  
Seaweed bed

**Palustrine** - “small, shallow, permanent or intermittent fresh water bodies”; total area <=8 ha (20 acres) and <=2 m water depth, for example:

Bog  
Fen  
Marsh  
Pond  
Rice fields  
Sw amp  
Wetland

**Riverine** - “a channel, an open conduit either naturally or artificially created which periodically or continuously contains moving water or which forms a connecting link between two bodies of standing water” salinity <=0.5 ppt; for example:

Creek  
River  
Stream  
Tidal river  
Tributary

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<sup>6</sup> With the exception of the ‘Artificial’ code, all codes are based on Cowardin, L.M., V. Carter, F.C.Golet, and E.T.LaRoe. 1979. Classification of Wetlands and Deepwater Habitats of the United States. FWS/OBS-79/31, USDI, Washington, DC:31 p.

**APPENDIX P. SUBSTRATE CODES**

Substrate	AQUIRE Code
Clay	CL
Gravel	GR
Mineral	M
Mixed substrate	MX
Mud	MU
Organic	O
Sand	SA
Silt	SI

**APPENDIX Q. FIELD LOCATION ABBREVIATIONS**

Aqu	Aquatic	NE*	Northeast
Agric	Agricultural	NW*	Northwest
Co	County	MT	Mountain
Cr	Creek	R	River
Dev	Development	Res	Research
Dis	District	Resvr	Reservoir
E*	East	S*	South
Env	Environmental	SE*	Southeast
Exp	Experimental	SW*	Southwest
Fish	Fisheries	St	Saint
Inst	Institute	Sta	Station
Isl	Island	USFWS	United States Fish and Wildlife Service
L	Lake	Univ	University
Lab	Laboratory	W*	West
Natl	National		
N*	North		

\* Do not abbreviate directional information that is part of the proper name of a location (e.g. South L or Northwest Territory).

**Example:**

Lester River, Lake Superior, Environmental Research Laboratory, Duluth.

Code as: Lester R, L Superior, Env Res Lab, Duluth.

# ECOTOX Aquatic Coding Guidelines

## APPENDIX R. GEOGRAPHIC TEXT

(codes are being deleted; not used by reviewers, assigned automatically during data entry; see programmers SOPs [6/9])

### **AF AFGHANISTAN**

Badakhshan  
Badghis  
Baghlan  
Balkh  
Bamian  
Farah  
Faryab  
Ghazni  
Ghowr  
Helmand  
Herat  
Jowzjan  
Kabol  
Kandahar  
Kapisa  
Konar  
Kondoz  
Laghman  
Lowgar  
Nangarhar  
Nimruz  
Oruzgan  
Paktia  
Paktika  
Parwan  
Samangan  
Sar-e Pol  
Takhar  
Vardak  
Zabol

### **AL ALBANIA**

Berat  
Dibre  
Durres  
Elbasan  
Fier  
Gjirokaster  
Gramsh  
Kolonje  
Korce  
Kruje  
Kukes  
Lezhe  
Librazhd  
Lushnje  
Mat  
Mirdite  
Permet  
Pogradec  
Puke  
Sarande  
Shkoder  
Skrapar  
Tepelene  
Tirane  
Tropoje  
Vlore

### **AG ALGERIA**

Adrar  
Ain Defla  
Ain Temouchent  
Alger  
Annaba  
Batna

Bechar  
Bejaia  
Biskra  
Blida  
Bordj Bou Arreridj  
Bouira  
Boumerdes  
Chlef  
Constantine  
Djelfa  
El Bayadh  
El Oued  
El Tarf  
Ghardaia  
Guelma  
Illizi  
Jijel  
Khenchela  
Laghouat  
Mascara  
Medea  
Mila  
Mostaganem  
M'sila  
Naama  
Oran  
Ouargla  
Oum el Bouaghi  
Relizane  
Saida  
Setif  
Sidi Bel Abbes  
Skikda  
Souk Ahras  
Tamanghasset  
Tebessa  
Tiaret  
Tindouf  
Tipaza  
Tissemsilt  
Tizi Ouzou  
Tlemcen

### **AQ AMERICAN SAMOA**

### **AN ANDORRA**

Andorra  
Canillo  
Encamp  
La Massana  
Ordino  
Sant Julia de Loria

### **AO ANGOLA**

Bengo  
Benguela  
Bie  
Cabinda  
Cuando Cubango  
Cuanza Norte  
Cuanza Sul  
Cunene  
Huambo  
Huila  
Luanda  
Lunda Norte  
Lunda Sul

Malanje  
Moxico  
Uige  
Zaire

### **AV ANGUILLA**

### **AY ANTARCTICA**

### **AC ANTIGUA AND BARBUDA**

Barbuda  
Saint George  
Saint John  
Saint Mary  
Saint Paul  
Saint Peter  
Saint Philip

### **AR ARGENTINA**

Buenos Aires  
Catamarca  
Chaco  
Chubut  
Cordoba  
Corrientes  
Distrito Federal  
Entre Rios  
Formosa  
Jujuy  
La Pampa  
La Rioja  
Mendoza  
Misiones  
Neuquen  
Rio Negro  
Salta  
San Juan  
San Luis  
Santa Cruz  
Santa Fe  
Santiago del Estero  
Tierra del Fuego, Antartidae Islas  
del Atlantico Sur  
Tucuman

### **AM ARMENIA**

### **AA ARUBA**

### **AT ASHMORE AND CARTIER ISLANDS**

### **\* AS AUSTRALIA**

Australian Capital Territory  
New South Wales  
Northern Territory  
Queensland  
South Australia  
Tasmania  
Victoria  
Western Australia

### **AU AUSTRIA**

Burgenland  
Karnten  
Niederosterreich

# ECOTOX Aquatic Coding Guidelines

Oberosterreich  
Salzburg  
Steiermark  
Tirol  
Vorarlberg  
Wien

## AJ AZERBAIJAN

## BF BAHAMAS, THE

Acklins and Crooked Islands  
Bimini  
Cat Island  
Exuma  
Freeport  
Fresh Creek  
Governor's Harbour  
Green Turtle Cay  
Harbour Island  
High Rock  
Inagua  
Kemps Bay  
Long Island  
Marsh Harbour  
Mayaguana  
New Providence  
Nichollstown and Berry Islands  
Ragged Island  
Rock Sound  
Sandy Point  
San Salvador and Rum Cay

## BA BAHRAIN

Al Hadd  
Al Manamah  
Al Mintaqah al Gharbiyah  
Al Mintaqah al Wusta  
Al Mintaqah ash Shamaliyah  
Al Muharraq  
Ar Rifa' wa al Mintaqah al Janubiyah  
Jidd Haf's  
Madinat Hamad  
Madinat 'Isa  
BA09 Mintaqat Juzur Hawar  
BA06 Sitrah

## FQ BAKER ISLAND

## BG BANGLADESH

BG22 Bagerhat  
BG04 Bandarban  
BG25 Barguna  
BG01 Barisal  
Bhola  
Bogra  
Brahmanbaria  
Chandpur  
Chapai Nawabganj  
Chattagram  
Chuadanga  
Comilla  
Cox's Bazar  
Dhaka  
Dinajpur  
Faridpur  
Feni  
Gaibandha  
Gazipur  
Gopalganj  
Habiganj

Jaipurhat  
Jamalpur  
Jessore  
Jhalakati  
Jhenaidah  
Khagrachari  
Khulna  
Kishorganj  
Kurigram  
Kushtia  
Laksmipur  
Lalmonirhat  
BG52 Madaripur  
BG53 Magura  
BG54 Manikganj  
BG55 Meherpur  
BG56 Moulavibazar  
BG57 Munshiganj  
BG12 My mensingh  
BG58 Naogaon  
BG59 Narail  
BG60 Narayanganj  
BG61 Narsingdi  
BG62 Nator  
BG63 Netrakona  
BG64 Nilphamari  
BG13 Noakhali  
BG65 Pabna  
BG66 Panchagar  
BG67 Parbattya Chattagram  
BG15 Patuakhali  
BG68 Pirojpur  
BG69 Rajbari  
BG70 Rajshahi  
BG71 Rangpur  
BG72 Satkhira  
BG73 Shariatpur  
BG74 Sherpur  
BG75 Sirajganj  
BG76 Sunamganj  
BG77 Sylhet  
BG78 Tangail  
BG79 Thakurgaon

## BB BARBADOS

BB01 Christ Church  
BB02 Saint Andrew  
BB03 Saint George  
BB04 Saint James  
BB05 Saint John  
Saint Joseph  
Saint Lucy  
Saint Michael  
Saint Peter  
Saint Philip  
Saint Thomas

## BS BASSAS DAINDIA

## BO BELARUS

## BE BELGIUM

Antwerpen  
Brabant  
Hainaut  
Liege  
Limburg  
Luxembourg  
Namur  
Oost-Vlaanderen  
West-Vlaanderen

## BH BELIZE

Belize  
Cayo  
Corozal  
Orange Walk  
Stann Creek  
Toledo

## BN BENIN

BN01 Atakora  
BN02 Atlantique  
BN03 Borgou  
BN04 Mono  
BN05 Oueme  
BN06 Zou

## BD BERMUDA

Devonshire  
Hamilton  
Hamilton  
Paget  
Pembroke  
Saint George  
Saint George's  
Sandy's  
Smiths  
Southampton  
Warwick

## BT BHUTAN

BT05 Bumthang  
BT06 Chhukha  
BT07 Chirang  
BT08 Daga  
BT09 Geylegphug  
BT10 Ha  
BT11 Lhuntshi  
BT12 Mongar  
BT13 Paro  
BT14 Pemagatsel  
BT15 Punakha  
BT16 Samchi  
BT17 Samdrup  
BT18 Shemgang  
BT19 Tashigang  
BT20 Thimphu  
BT21 Tongsa  
BT22 Wangdi Phodrang

## BL BOLIVIA

BL01 Chuquisaca  
BL02 Cochabamba  
BL03 El Beni  
BL04 La Paz  
BL05 Oruro  
BL06 Pando  
BL07 Potosi  
BL08 Santa Cruz  
BL09 Tarija

## BK BOSNIA AND HERZEGOVINA

## \* BC BOTSWANA

BC01 Central  
BC02 Chobe  
BC03 Ghanzi  
BC04 Kgalagadi  
BC05 Kgatleng  
BC06 Kweneng  
BC07 Ngamiland

# ECOTOX Aquatic Coding Guidelines

BC08 North-East	UV29 Mouhoun	CM11 Centre
BC09 South-East	UV30 Namentenga	CM04 Est
BC10 Southern	UV31 Naouri	CM12 Extreme-Nord
<b>BV BOUVET ISLAND</b>	UV32 Oubritenga	CM05 Littoral
	UV33 Oudalan	CM13 Nord
<b>* BR BRAZIL</b>	UV34 Passore	CM07 Nord-Ouest
BR01 Acre	UV35 Poni	CM08 Ouest
BR02 Alagoas	UV36 Sanguie	CM14 Sud
BR03 Amapa	UV37 Sanmatenga	CM09 Sud-Ouest
BR04 Amazonas	UV38 Seno	
BR05 Bahia	UV39 Sissili	<b>* CA CANADA</b>
BR06 Ceara	UV40 Soum	* CA01 Alberta
BR07 Distrito Federal	UV41 Sourou	* CA02 British Columbia
BR08 Espirito Santo	UV42 Tapoa	* CA03 Manitoba
BR29 Goias	UV43 Yatenga	* CA04 New Brunswick
BR13 Maranhao	UV44 Zoundweogo	* CA05 Newfoundland
BR14 Mato Grosso	<b>BM BURMA</b>	* CA06 Northwest Territories
BR11 Mato Grosso do Sul	BM02 Chin State	* CA07 Nova Scotia
BR15 Minas Gerais	BM03 Irrawaddy	* CA08 Ontario
BR16 Para	BM04 Kachin State	* CA09 Prince Edward Island
BR17 Paraiba	BM05 Karan State	* CA10 Quebec
BR18 Parana	BM06 Kayah State	* CA11 Saskatchewan
BR30 Pernambuco	BM07 Magwe	* CA12 Yukon Territory
BR20 Piaui	BM08 Mandalay	
BR21 Rio de Janeiro	BM13 Mon State	<b>CV CAPE VERDE</b>
BR22 Rio Grande do Norte	BM09 Pegu	CV01 Boa Vista
BR23 Rio Grande do Sul	BM01 Rakhine State	CV02 Brava
BR24 Rondonia	BM14 Rangoon	CV03 Fogo
BR25 Roraima	BM10 Sagaing	CV04 Maio
BR26 Santa Catarina	BM11 Shan State	CV05 Paul
BR27 Sao Paulo	BM12 Tenasserim	CV06 Praia
BR28 Sergipe		CV07 Ribeira Grande
BR31 Tocantins		CV08 Sal
	<b>BY BURUNDI</b>	Santa Catarina
<b>IO BRITISH INDIAN OCEAN TERRITORY</b>	BY09 Bubanza	Sao Nicolau
	BY02 Bujumbura	Sao Vicente
<b>VI BRITISH VIRGIN ISLANDS</b>	BY10 Bururi	Tarrafal
	BY11 Cankuzo	
<b>BX BRUNEI</b>	BY12 Cibitoke	<b>CJ CAYMAN ISLANDS</b>
BX01 Belait	BY13 Gitega	CJ01 Creek
BX02 Brunei and Muara	BY14 Karuzi	CJ02 Eastern
BX03 Temburong	BY15 Kayanza	CJ03 Midland
BX04 Tutong	BY16 Kirundo	CJ04 South Town
	BY17 Makamba	CJ05 Spot Bay
<b>BU BULGARIA</b>	BY05 Muramvya	CJ06 Stake Bay
BU29 Burgas	BY18 Muyinga	CJ07 West End
BU30 Grad Sofiya	BY19 Ngozi	CJ08 Western
BU31 Khaskovo	BY20 Rutana	
BU32 Lovech	BY21 Ruyigi	<b>CT CENTRAL AFRICAN REPUBLIC</b>
BU33 Mikhaylovgrad		CT01 Bamingui-Bangoran
BU34 Plovdiv	<b>CB CAMBODIA</b>	CT18 Bangui
BU35 Razgrad	CB01 Batdambang	CT02 Basse-Kotto
BU36 Sofiya	CB02 Kampong Cham	CT15 Gribingui
BU37 Varna	CB03 Kampong Chhnang	CT03 Haute-Kotto
<b>* UV BURKINA</b>	CB04 Kampong Spoe	CT04 Haute-Sangha
UV15 Bam	CB05 Kampong Thum	CT05 Haut-Mbomou
UV16 Bazega	CB06 Kampot	CT06 Kemo-Gribingui
UV17 Bougouriba	CB07 Kandal	CT07 Lobaye
UV18 Boulgou	CB08 Kaoh Kong	CT08 Mbomou
UV19 Boulkiemde	CB09 Kracheh	CT09 Nana-Mambere
UV20 Ganzourgou	CB10 Mondol Kiri	CT17 Ombella-Mpoko
UV21 Gnagna	CB11 Phnum Penh	CT11 Ouaka
UV22 Gourma	CB12 Pouthisat	CT12 Ouham
UV23 Houet	CB13 Preah Vihear	CT13 Ouham-Pende
UV24 Kadiogo	CB14 Prey Veng	CT16 Sangha
UV25 Kenedougou	CB15 Rotanokiri	CT14 Vakaga
UV26 Komoe	CB16 Siemreab-Otdar Meanchey	
UV27 Kossi	CB17 Stoeng Treng	<b>CD CHAD</b>
UV28 Kouritenga	CB18 Svay Rieng	CD01 Batha
	CB19 Takev	CD02 Biltine
	<b>* CM CAMEROON</b>	
	CM10 Adamaoua	

CD03	Borkou-Ennedi-Tibesti	Amazonas	IV07	Biankouma
CD04	Chari-Baguirmi	Antioquia	IV38	Bondoukou
CD05	Guera	Arauca	IV27	Bongouanou
CD06	Kanem	Atlantico	IV39	Bouafle
CD07	Lac	Boliv ar	IV40	Bouake
CD08	Logone Occidental	Boyaca	IV11	Bouna
CD09	Logone Oriental	Caldas	IV12	Boundiali
CD10	Mayo-Kebbi	Caqueta	IV03	Dabakala
CD11	Moyen-Chari	Casanare	IV41	Daloa
CD12	Ouaddai	Cauca	IV14	Danane
CD13	Salamat	Cesar	IV42	Daoukro
CD14	Tandjile	Choco	IV43	Dimbokro
		Cordoba	IV16	Divo
<b>CI CHILE</b>		Cundinamarca	IV44	Duekoue
CI02	Aisen del General Carlos	Distrito Especial	IV17	Ferkessedougou
Ibanez	del Campo	Guainia	IV18	Gagnoa
CI03	Antofagasta	Guaviare	IV45	Grand-Lahou
CI04	Araucania	Huila	IV46	Guiglo
CI05	Atacama	La Guajira	IV28	Issia
CI06	Bio-Bio	Magdalena	IV20	Katiola
CI07	Coquimbo	Meta	IV21	Korhogo
CI08	Libertador General Bernardo	Narino	IV29	Lakota
	O'Higgins	Norte de Santander	IV47	Man
CI09	Los Lagos	Putumayo	IV30	Mankono
CI10	Magallanes y de la Antartica	Quindio	IV48	Mbahiakro
	Chilena	Risaralda	IV23	Odienne
CI11	Maule	San Andres y Providencia	IV31	Oume
CI12	Region Metropolitana	Santander	IV49	Sakassou
CI13	Tarapaca	Sucre	IV50	San Pedro
	Valparaiso	Tolima	IV51	Sassandra
		Valle del Cauca	IV25	Seguela
		Vaupes	IV52	Sinfra
<b>* CH CHINA</b>		CVichada	IV32	Soubre
CH01	Anhui		IV53	Tabou
CH22	Beijing	<b>CN COMOROS</b>	IV54	Tanda
CH07	Fujian	Anjouan	IV55	Tiassale
CH15	Gansu	Grande Comore	IV33	Tingrela
CH30	Guangdong	Moheli	IV26	Touba
CH16	Guangxi		IV56	Toumodi
CH18	Guizhou	<b>CF CONGO</b>	IV57	Vavoua
CH31	Hainan	Bouenza	IV58	Yamoussoukro
CH10	Hebei	Brazzaville	IV34	Zuenoula
CH08	Heilongjiang	Cuvette		
CH09	Henan	Kouilou	<b>HR CROATIA</b>	
CH12	Hubei	Lekoumou		
CH11	Hunan	Likouala	<b>CU CUBA</b>	
CH04	Jiangsu	Niari	CU05	Camaguey
CH03	Jiangxi	Plateaux	CU07	Ciego de Avila
CH05	Jilin	Pool	CU08	Cienfuegos
CH19	Liaoning	Sangha	CU02	Ciudad de la Habana
CH20	Nei Mongol		CU09	Granma
CH21	Ningxia	<b>CW COOK ISLANDS</b>	CU10	Guantanamo
CH06	Qinghai	<b>CR CORAL SEA ISLANDS</b>	CU12	Holguin
CH26	Shaanxi		CU04	Isla de la Juventud
CH25	Shandong	<b>CS COSTARICA</b>	CU11	La Habana
CH23	Shanghai	CS01	CU13	Las Tunas
CH24	Shanxi	Alajuela	CU03	Matanzas
CH27	Sichuan	CS02	CU01	Pinar del Rio
CH28	Tianjin	Cartago	CU14	Sancti Spiritus
CH13	Xinjiang	CS03	CU15	Santiago de Cuba
CH14	Xizang	Guanacaste	CU16	Villa Clara
CH29	Yunnan	CS04		
CH02	Zhejiang	Heredia	<b>CY CYPRUS</b>	
		CS06	Famagusta	
		CS07	Kyrenia	
		CS08	Larnaca	
<b>KT CHRISTMAS ISLAND</b>			Limassol	
		<b>IV COTE D'IVOIRE</b>	Nicosia	
<b>IP CLIPPERTON ISLAND</b>		IV01	Paphos	
		Abengourou		
<b>CK COCOS (KEELING) ISLANDS</b>		IV35		
		Abidjan	<b>* EZ CZECH REPUBLIC</b>	
		IV04		
		Aboisso		
		IV05		
		Adzope		
		IV06		
		Agboville		
		IV36		
		Bangolo		
<b>CO COLOMBIA</b>		IV37		
		Beoumi		

# ECOTOX Aquatic Coding Guidelines

## \* DA DENMARK

DA01 Arhus  
DA02 Bornholm  
DA03 Frederiksborg  
DA04 Fyn  
DA05 Kobenhavn  
DA07 Nordjylland  
DA08 Ribe  
DA09 Ringkobing  
DA10 Roskilde  
DA11 Sonderjylland  
DA06 Staden Kobenhavn  
DA12 Storstrom  
DA13 Vejle  
DA14 Vestsjælland  
DA15 Viborg

## DJ DJIBOUTI

DJ01 'Ali Sabih  
DJ02 Dikhil  
DJ03 Djibouti  
DJ04 Obock  
DJ05 Tadjoura

## DO DOMINICA

DO02 Saint Andrew  
DO03 Saint David  
DO04 Saint George  
DO05 Saint John  
DO06 Saint Joseph  
DO07 Saint Luke  
DO08 Saint Mark  
DO09 Saint Patrick  
DO10 Saint Paul  
DO11 Saint Peter

## DR DOMINICAN REPUBLIC

DR01 Azua  
DR02 Baoruco  
DR03 Barahona  
DR04 Dajabon  
DR05 Distrito Nacional  
DR06 Duarte  
DR11 Elias Pina  
DR28 El Seibo  
DR08 Espaillat  
DR29 Hato Mayor  
DR09 Independencia  
DR10 La Altagracia  
DR12 La Romana  
DR30 La Vega  
DR14 Maria Trinidad Sanchez  
DR31 Monsenor Nouel  
DR15 Monte Cristi  
DR32 Monte Plata  
DR16 Pedernales  
DR17 Peravia  
DR18 Puerto Plata  
DR19 Salcedo  
DR20 Samana  
DR21 Sanchez Ramirez  
DR33 San Cristobal  
DR23 San Juan  
DR24 San Pedro De Macoris  
DR25 Santiago  
DR26 Santiago Rodriguez  
DR27 Valverde

## EC ECUADOR

EC02 Azuay  
EC03 Bolivar

EC04 Canar  
EC05 Carchi  
EC06 Chimborazo  
EC07 Cotopaxi  
EC08 El Oro  
EC09 Esmeraldas  
EC01 Galapagos  
EC10 Guayas  
EC11 Imbabura  
EC12 Loja  
EC13 Los Rios  
EC14 Manabi  
EC15 Morona-Santiago  
EC21 Napo  
EC17 Pastaza  
EC18 Pichincha  
EC22 Sucumbios  
EC19 Tungurahua  
EC20 Zamora-Chinchipe

## \* EG EGYPT

EG01 Ad Daqahliyah  
EG02 Al Bahr al Ahmar  
EG03 Al Buhayrah  
EG04 Al Fayyum  
EG05 Al Gharbiyah  
EG06 Al Iskandariyah  
EG07 Al Isma'iliyah  
EG08 Al Jizah  
EG09 Al Minufiyah  
EG10 Al Minya  
EG11 Al Qahirah  
EG12 Al Qalyubiyah  
EG13 Al Wadi al Jadid  
EG14 Ash Sharqiyah  
EG15 As Suways  
EG16 Aswan  
EG17 Asyut  
EG18 Bani Suwayf  
EG19 Bur Sa'id  
EG20 Dumyat  
EG26 Janub Sina'  
EG21 Kafr ash Shaykh  
EG22 Matruh  
EG23 Qina  
EG27 Shamal Sina'  
EG24 Suhaj

## ES EL SALVADOR

ES01 Ahuachapan  
ES02 Cabanas  
ES03 Chalatenango  
ES04 Cuscatlan  
ES05 La Libertad  
ES06 La Paz  
ES07 La Union  
ES08 Morazan  
ES09 San Miguel  
ES10 San Salvador  
ES11 Santa Ana  
ES12 San Vicente  
ES13 Sonsonate  
ES14 Usulután

## EK EQUATORIAL GUINEA

EK03 Annobon  
EK04 Bioko Norte  
EK05 Bioko Sur  
EK06 Centro Sur  
EK07 Kie-Ntem  
EK08 Litoral

EK09 Wele-Nzas

## ER ERITREA

## EN ESTONIA

EN01 Harjumaa  
EN02 Hiiumaa  
EN03 Ida-Virumaa  
EN04 Jarvamaa  
EN05 Jogeamaa  
EN06 Kohtla-Jarve  
EN07 Laanemaa  
EN08 Laane-Virumaa  
EN09 Narva  
EN10 Parnu  
EN11 Parnumaa  
EN12 Polvamaa  
EN13 Raplamaa  
EN14 Saaremaa  
EN15 Sillamae  
EN16 Tallinn  
EN17 Tartu  
EN18 Tartumaa  
EN19 Valgamaa  
EN20 Viljandimaa  
EN21 Vorumaa

## ET ETHIOPIA

ET15 Adis Abeba  
ET01 Arsi  
ET17 Asosa  
ET38 Bale  
ET18 Borena  
ET19 Debub Gonder  
ET20 Debub Shewa  
ET21 Debub Welo  
ET22 Dire Dawa  
ET23 Gambela  
ET39 Gamo Gofa  
ET40 Ilubabor  
ET41 Kefa  
ET24 Metekel  
ET25 Mirab Gojam  
ET26 Mirab Harerge  
ET27 Mirab Shewa  
ET28 Misrak Gojam  
ET29 Misrak Harerge  
ET30 Nazret  
ET31 Ogaden  
ET32 Omo  
ET33 Semen Gonder  
ET34 Semen Shewa  
ET35 Semen Welo  
ET42 Sidamo  
ET37 Tigray  
ET43 Welega

## EU EUROPAISLAND

## FK FALKLAND ISLANDS (ISLAS MALVINAS)

## FO FAROE ISLANDS

## FM FEDERATED STATES OF MICRONESIA

FM03 Chuuk  
FM01 Kosrae  
FM02 Pohnpei  
FM04 Yap

# ECOTOX Aquatic Coding Guidelines

## FJ FIJI

FJ01 Central  
FJ02 Eastern  
FJ03 Northern  
FJ04 Rotuma  
FJ05 Western

## \* FI FINLAND

FI01 Ahvenanmaa  
FI02 Häme  
FI03 Keski-Suomi  
FI04 Kuopio  
FI05 Kymi  
FI06 Lappi  
FI07 Mikkeli  
FI08 Oulu  
FI09 Pohjois-Karjala  
FI10 Turku ja Pori  
FI11 Uusimaa  
FI12 Vaasa

## \* FR FRANCE

FRC1 Alsace  
FR97 Aquitaine  
FR98 Auvergne  
FR99 Basse-Normandie  
FRA1 Bourgogne  
FRA2 Bretagne  
FRA3 Centre  
FRA4 Champagne-Ardenne  
FRA5 Corse  
FRA6 Franche-Comté  
FRA7 Haute-Normandie  
FRA8 Île-de-France  
FRA9 Languedoc-Roussillon  
FRB1 Limousin  
FRB2 Lorraine  
FRB3 Midi-Pyrénées  
FRB4 Nord-Pas-de-Calais  
FRB5 Pays de la Loire  
FRB6 Picardie  
FRB7 Poitou-Charentes  
FRB8 Provence-Alpes-Côte d'Azur  
FRB9 Rhône-Alpes

## FG FRENCH GUIANA

## FP FRENCH POLYNESIA

## FS FRENCH SOUTHERN AND ANTARCTIC LANDS

## GB GABON

GB01 Estuaire  
GB02 Haut-Ogooue  
GB03 Moyen-Ogooue  
GB04 Ngounie  
GB05 Nyanga  
GB06 Ogooue-Ivindo  
GB07 Ogooue-Lolo  
GB08 Ogooue-Maritime  
GB09 Woleu-Ntem

## GA GAMBIA, THE

GA01 Banjul  
GA02 Lower River  
GA03 MacCarthy Island  
GA07 North Bank  
GA04 Upper River  
GA05 Western

## GZ GAZA STRIP

## GG GEORGIA

## \* GM GERMANY

GM01 Baden-Württemberg  
GM02 Bayern  
GM16 Berlin  
GM11 Brandenburg  
GM03 Bremen  
GM04 Hamburg  
GM05 Hessen  
GM12 Mecklenburg-Vorpommern  
GM06 Niedersachsen  
GM07 Nordrhein-Westfalen  
GM08 Rheinland-Pfalz  
GM09 Saarland  
GM13 Sachsen  
GM14 Sachsen-Anhalt  
GM10 Schleswig-Holstein  
GM15 Thüringen

## \* GH GHANA

GH02 Ashanti  
GH03 Brong-Ahafo  
GH04 Central  
GH05 Eastern  
GH01 Greater Accra  
GH06 Northern  
GH10 Upper East  
GH11 Upper West  
GH08 Volta  
GH09 Western

## GI GIBRALTAR

## GO GLORIOSO ISLANDS

## GR GREECE

GR31 Aitolia kai Akarnania  
GR38 Akhaia  
GR36 Argolis  
GR41 Arkadhia  
GR20 Arta  
GR35 Attiki  
GR47 Dhodhekanisos  
GR04 Drama  
GR30 Evritania  
GR01 Evros  
GR34 Evvoia  
GR08 Florina  
GR32 Fokis  
GR29 Fthiotis  
GR10 Grevena  
GR39 Ilia  
GR12 Imathia  
GR17 Ioannina  
GR45 Iraklion  
GR23 Kardhitsa  
GR09 Kastoria  
GR14 Kavala  
GR27 Kefallinia  
GR25 Kerkira  
GR15 Khalkidhiki  
GR43 Khandia  
GR50 Khios  
GR49 Kikladhes  
GR06 Kilikis  
GR37 Korinthia  
GR11 Kozani

GR42 Lakonia  
GR21 Larisa  
GR46 Lasithi  
GR51 Lesvos  
GR26 Levkas  
GR24 Magnisia  
GR40 Messinia  
GR07 Pella  
GR16 Pieria  
GR19 Preveza  
GR44 Rethimni  
GR02 Rodhopi  
GR48 Samos  
GR05 Serrai  
GR18 Thesprotia  
GR13 Thessaloniki  
GR22 Trikala  
GR33 Viotia  
GR03 Xanthi  
GR28 Zakynthos

## GL GREENLAND

GL01 Nordgrönland  
GL02 Ostgrönland  
GL03 Vestgrönland

## GJ GRENADA

GJ01 Saint Andrew  
GJ02 Saint David  
GJ03 Saint George  
GJ04 Saint John  
GJ05 Saint Mark  
GJ06 Saint Patrick

## GP GUADELOUPE

## GQ GUAM

## GT GUATEMALA

GT01 Alta Verapaz  
GT02 Baja Verapaz  
GT03 Chimaltenango  
GT04 Chiquimula  
GT05 El Progreso  
GT06 Escuintla  
GT07 Guatemala  
GT08 Huehuetenango  
GT09 Izabal  
GT10 Jalapa  
GT11 Jutiapa  
GT12 Peten  
GT14 Quiché  
GT13 Quetzaltenango  
GT15 Retalhuleu  
GT16 Sacatepequez  
GT17 San Marcos  
GT18 Santa Rosa  
GT19 Solola  
GT20 Suchitepequez  
GT21 Totonicapan  
GT22 Zacapa

## GK GUERNSEY

## GV GUINEA

GV01 Beyla  
GV02 Boffa  
GV03 Boke  
GV04 Conakry  
GV05 Dabola  
GV06 Dalaba

GV07	Dingiraye	HO08	Francisco Morazan	IC13	Isaf jordur
GV08	Dubreka	HO09	Gracias a Dios	IC14	Keflavik
GV09	Faranah	HO10	Intibuca	IC15	Kjosarsy sla
GV10	Forecariah	HO11	Islas de la Bahia	IC16	Kopavogur
GV11	Fria	HO12	La Paz	IC17	Myrasy sla
GV12	Gaual	HO13	Lempira	IC18	Neskaupstadur
GV13	Gueckedou	HO14	Ocotepeque	IC19	Nordur-Isafjardarsy sla
GV14	Kankan	HO15	Olancho	IC20	Nordur-Mulasy sla
GV15	Kerouane	HO16	Santa Barbara	IC21	Nordur-Tingeyjarsy sla
GV16	Kindia	HO17	Valle	IC22	Olafsfjordur
GV17	Kissidougou	HO18	Yoro	IC23	Rangarv allasy sla
GV18	Koundara			IC24	Reykjavik
GV19	Kouroussa	<b>HK HONG KONG</b>		IC25	Saudarkrokur
GV20	Labe			IC26	Seydisfjordur
GV21	Macenta	<b>HQ HOWLAND ISLAND</b>		IC27	Siglufjordur
GV22	Mali			IC28	Skagafjardarsy sla
GV23	Mamou	<b>* HU HUNGARY</b>		IC29	Snafellsnes-og
GV24	Nzerekore	HU01	Bacs-Kiskun	Hnappadalssy sla	
GV25	Pita	HU02	Baranya	IC30	Strandasy sla
GV26	Sigiri	HU03	Bekes	IC31	Sudur-Mulasy sla
GV27	Telimele	HU26	Bekescsaba	IC32	Sudur-Tingeyjarsy sla
GV28	Tougue	HU04	Borsod-Abaúj-Zemplén	IC33	Vestmannaeyjar
GV29	Yomou	HU05	Budapest	IC34	Vestur-Bardastrandarsy sla
		HU06	Csongrad	IC35	Vestur-Hunavatnssy sla
<b>PU GUINEA-BISSAU</b>		HU07	Debrecen	IC36	Vestur-Isafjardarsy sla
PU01	Bafata	HU27	Dunaújváros	IC37	Vestur-Skaftafellssy sla
PU12	Biombo	HU28	Eger		
PU11	Bissau	HU08	Fejér	<b>* IN INDIA</b>	
PU05	Bolama	HU25	Győr	IN01	Andaman and Nicobar
PU06	Cacheu	HU09	Győr-Ménfőcsanak-Sopron	Islands	
PU10	Gabu	HU10	Hajdu-Bihar	IN02	Andhra Pradesh
PU04	Oio	HU11	Hévíz	IN30	Arunachal Pradesh
PU02	Quinara	HU29	Hódmezővásárhely	IN03	Assam
PU07	Tombali	HU20	Jász-Nagykun-Szolnok	IN04	Bihar
		HU30	Kaposvár	IN05	Chandigarh
<b>GY GUYANA</b>		HU31	Kecskemét	IN06	Dadra and Nagar Haveli
GY10	Barima-Waini	HU12	Komárom-Esztergom	IN32	Daman and Diu
GY11	Cuyuni-Mazaruni	HU13	Miskolc	IN07	Delhi
GY12	Demerara-Mahaica	HU32	Nagykanizsa	IN33	Goa
GY13	East Berbice-Corentyne	HU14	Nógrád	IN09	Gujarat
GY14	Essequibo Islands-West	HU33	Nyíregyháza	IN10	Haryana
Demerara		HU15	Pécs	IN11	Himachal Pradesh
GY15	Mahaica-Berbice	HU16	Pest	IN12	Jammu and Kashmir
GY16	Pomeroon-Supenaam	HU17	Somogy	IN19	Karnataka
GY17	Potaro-Siparuni	HU34	Sopron	IN13	Kerala
GY18	Upper Demerara-Berbice	HU18	Szabolcs-Szatmár-Bereg	IN14	Lakshadweep
GY19	Upper Takutu-Upper	HU19	Szeged	IN15	Madhya Pradesh
Essequibo		HU35	Székesfehérvár	IN16	Maharashtra
		HU36	Szolnok	IN17	Manipur
<b>HA HAITI</b>		HU37	Szombathely	IN18	Meghalaya
HA06	Artibonite	HU38	Tatabánya	IN31	Mizoram
HA07	Centre	HU21	Tolna	IN20	Nagaland
HA08	Grand'Anse	HU22	Vas	IN21	Orissa
HA09	Nord	HU23	Veszprém	IN22	Pondicherry
HA10	Nord-Est	HU39	Veszprém	IN23	Punjab
HA03	Nord-Ouest	HU24	Zala	IN24	Rajasthan
HA11	Ouest	HU40	Zalaegerszeg	IN29	Sikkim
HA12	Sud			IN25	Tamil Nadu
HA13	Sud-Est			IN26	Tripura
		<b>IC ICELAND</b>		IN27	Uttar Pradesh
<b>HM HEARD ISLAND AND</b>		IC01	Akranes	IN28	West Bengal
<b>MCDONALD ISLANDS</b>		IC02	Akureyri		
		IC03	Arnessy sla	<b>ID INDONESIA</b>	
<b>HO HONDURAS</b>		IC04	Austur-Bardastrandarsy sla	ID01	Aceh
HO01	Atlántida	IC05	Austur-Hunavatnssy sla	ID02	Bali
HO02	Choluteca	IC06	Austur-Skaftafellssy sla	ID03	Bengkulu
HO03	Colón	IC07	Borgarfjardarsy sla	ID09	Irian Jaya
HO04	Comayagua	IC08	Dalasy sla	ID04	Jakarta Raya
HO05	Copan	IC09	Eyjafjardarsy sla	ID05	Jambi
HO06	Cortés	IC10	Gullbringusy sla	ID06	Jawa Barat
HO07	El Paraiso	IC11	Hafnarfjordur	ID07	Jawa Tengah
		IC12	Húsavík		

# ECOTOX Aquatic Coding Guidelines

ID11	Kalimantan Barat	EI10	Galway	JA02	Akita
ID12	Kalimantan Selatan	EI11	Kerry	JA03	Aomori
ID13	Kalimantan Tengah	EI12	Kildare	JA04	Chiba
ID14	Kalimantan Timur	EI13	Kilkenny	JA05	Ehime
ID15	Lampung	EI15	Laois	JA06	Fukui
ID16	Maluku	EI14	Leitrim	JA07	Fukuoka
ID17	Nusa Tenggara Barat	EI16	Limerick	JA08	Fukushima
ID18	Nusa Tenggara Timur	EI18	Longford	JA09	Gifu
ID19	Riau	EI19	Louth	JA10	Gumma
ID20	Sulawesi Selatan	EI20	Mayo	JA11	Hiroshima
ID21	Sulawesi Tengah	EI21	Meath	JA12	Hokkaido
ID22	Sulawesi Tenggara	EI22	Monaghan	JA13	Hyogo
ID23	Sulawesi Utara	EI23	Offaly	JA14	Ibaraki
ID24	Sumatera Barat	EI24	Roscommon	JA15	Ishikawa
ID25	Sumatera Selatan	EI25	Sligo	JA16	Iwate
ID26	Sumatera Utara	EI26	Tipperary	JA17	Kagawa
ID27	Timor Timur	EI27	Waterford	JA18	Kagoshima
ID10	Yogyakarta	EI29	Westmeath	JA19	Kanagawa
		EI30	Wexford	JA20	Kochi
		EI31	Wicklow	JA21	Kumamoto
<b>* IR IRAN</b>		<b>* IS ISRAEL</b>		JA22	Kyoto
IR01	Azərbaycan-e Bakhtari	IS01	HaDarom	JA23	Mie
IR02	Azərbaycan-e Khavari	IS02	HaMerkaz	JA24	Miyagi
IR13	Bakhtaran	IS03	HaZafon	JA25	Miyazaki
IR22	Bushehr	IS04	Hefa	JA26	Nagano
IR03	Chahar Mahall va Bakhtiari	IS05	Tel Aviv	JA27	Nagasaki
IR28	Esfahan	IS06	Yerushalayim	JA28	Nara
IR07	Fars			JA29	Niigata
IR08	Gilan	<b>* IT ITALY</b>		JA30	Oita
IR09	Hamadan	IT01	Abruzzi	JA31	Okayama
IR11	Hormozgan	IT02	Basilicata	JA47	Okinawa
IR10	Ilam	IT03	Calabria	JA32	Osaka
IR29	Kerman	IT04	Campania	JA33	Saga
IR30	Khorasan	IT05	Emilia-Romagna	JA34	Saitama
IR15	Khuzestan	IT06	Friuli-Venezia Giulia	JA35	Shiga
IR05	Kohgiluyeh va Buyer Ahmadi	IT07	Lazio	JA36	Shimane
IR16	Kordestan	IT08	Liguria	JA37	Shizuoka
IR23	Lorestan	IT09	Lombardia	JA38	Tochigi
IR24	Markazi	IT10	Marche	JA39	Tokushima
IR17	Mazandaran	IT11	Molise	JA40	Tokyo
IR25	Semnan	IT12	Piemonte	JA41	Tottori
IR04	Sistan va Baluchestan	IT13	Puglia	JA42	Toyama
IR26	Tehran	IT14	Sardegna	JA43	Wakayama
IR31	Yazd	IT15	Sicilia	JA44	Yamagata
IR27	Zanjan	IT16	Toscana	JA45	Yamaguchi
<b>IZ IRAQ</b>		IT17	Trentino-Alto Adige	JA46	Yamanashi
IZ01	Al Anbar	IT18	Umbria		
IZ02	Al Basrah	IT19	Valle d'Aosta	<b>DQ JARVIS ISLAND</b>	
IZ03	Al Muthanna	IT20	Veneto	<b>JE JERSEY</b>	
IZ04	Al Qadisiyah	<b>* JM JAMAICA</b>		<b>JQ JOHNSTON ATOLL</b>	
IZ17	An Najaf	JM01	Clarendon	<b>JO JORDAN</b>	
IZ11	Arbil	JM02	Hanover	JO02	Al Balqa'
IZ05	As Sulaymaniyah	JM17	Kingston	JO09	Al Karak
IZ13	At Ta'mim	JM04	Manchester	JO10	Al Mafraq
IZ06	Babil	JM07	Portland	JO11	'Amman
IZ07	Baghdad	JM08	Saint Andrew	JO12	At Tafilah
IZ08	Dahuk	JM09	Saint Ann	JO13	Az Zarqa
IZ09	Dhi Qar	JM10	Saint Catherine	JO14	Irbid
IZ10	Diyala	JM11	Saint Elizabeth	JO07	Ma'an
IZ12	Karbala'	JM12	Saint James		
IZ14	Maysan	JM13	Saint Mary	<b>JU JUAN DE NOVA ISLAND</b>	
IZ15	Ninawa	JM14	Saint Thomas	<b>KZ KAZAKHSTAN</b>	
IZ18	Salah ad Din	JM15	Trelawny	<b>KE KENYA</b>	
IZ16	Wasit	JM16	Westmoreland	KE01	Central
<b>EI IRELAND</b>		<b>JN JAN MAYEN</b>		KE02	Coast
EI01	Carlow	<b>* JA JAPAN</b>		KE03	Eastern
EI02	Cavan	JA01	Aichi		
EI03	Clare				
EI04	Cork				
EI06	Donegal				
EI07	Dublin				

# ECOTOX Aquatic Coding Guidelines

KE05 Nairobi Area  
KE06 North-Eastern  
KE07 Nyanza  
KE08 Rift Valley  
KE09 Western

## KQ KINGMAN REEF

## KR KIRIBATI

KR01 Gilbert Islands  
KR02 Line Islands  
KR03 Phoenix Islands

## KN KOREA, DEMOCRATIC PEOPLE'S REPUBLIC OF

KN01 Chagang-do  
KN16 Hamgyong-bukto  
KN03 Hamgyong-namdo  
KN07 Hwanghae-bukto  
KN06 Hwanghae-namdo  
KN08 Kaesong-si  
KN09 Kangwon-do  
KN14 Nampo-si  
KN11 P'yongan-bukto  
KN15 P'yongan-namdo  
KN12 P'yongyang-si  
KN13 Yanggang-do

## \* KS KOREA, REPUBLIC OF

KS01 Cheju-do  
KS03 Cholla-bukto  
KS16 Cholla-namdo  
KS05 Ch'ungch'ong-bukto  
KS17 Ch'ungch'ong-namdo  
KS12 Inch'on-jikhalsi  
KS06 Kangwon-do  
KS18 Kwangju-jikhalsi  
KS13 Kyonggi-do  
KS14 Kyongsang-bukto  
KS08 Kyongsang-namdo  
KS10 Pusan-jikhalsi  
KS11 Soul-t'ukpyolsi  
KS15 Taegu-jikhalsi  
KS19 Taejon-jikhalsi

## KU KUWAIT

Al Ahmadi  
Al Kuwayt  
Hawalli

## KG KYRGYZSTAN

## LA LAOS

LA01 Attapu  
LA02 Champasak  
LA03 Houaphan  
LA04 Khammouan  
LA05 Louang Namtha  
LA06 Louangphrabang  
LA07 Oudomxai  
LA08 Phongsali  
LA09 Saravan  
LA10 Savannakhet  
LA11 Vientiane  
LA13 Xaignabouri  
LA14 Xiangkhoang

## LG LATVIA

## LE LEBANON

Al Biq'a

Al Janub  
Ash Shamal  
Bayrut  
Jabal Lubnan

## LT LESOTHO

LT10 Berea  
LT11 Butha-Buthe  
LT12 Leribe  
LT13 Mafeteng  
LT14 Maseru  
LT15 Mophale Hoek  
LT16 Mokhotlong  
LT17 Quthing  
LT18 Quthing  
LT19 Thaba-Tseka

## LI LIBERIA

LI01 Bong  
LI03 Grand Bassa  
LI04 Grand Cape Mount  
LI02 Grand Jide  
LI05 Lofa  
LI06 Maryland  
LI07 Monrovia  
LI08 Montserrado  
LI09 Nimba  
LI10 Sino

## LY LIBYA

LY47 Ajdabiya  
LY03 Al 'Aziziyah  
LY48 Al Fatih  
LY49 Al Jabal al Akhdar  
LY05 Al Jufrah  
LY50 Al Khums  
LY08 Al Kufrah  
LY51 An Nuqat al Khams  
LY13 Ash Shati'  
LY52 Awbari  
LY53 Az Zawiyah  
LY54 Banghazi  
LY55 Darnah  
LY56 Ghadamis  
LY57 Gharyan  
LY58 Misratah  
LY30 Murzuq  
LY34 Sabha  
LY59 Sawfajjin  
LY60 Surt  
LY61 Tarabulus  
LY41 Tarhunah  
LY42 Tubruq  
LY62 Yafra  
LY45 Zlitan

## LS LIECHTENSTEIN

LS01 Balzers  
LS02 Eschen  
LS03 Gamprin  
LS04 Mauren  
LS05 Planken  
LS06 Ruggell  
LS07 Schaan  
LS08 Schellenberg  
LS09 Triesen  
LS10 Triesenberg  
LS11 Vaduz

## LH LITHUANIA

## LU LUXEMBOURG

LU01 Diekirch  
LU02 Grevenmacher  
LU03 Luxembourg

## MC MACAU

MC01 Ilhas  
MC02 Macau

## MK MACEDONIA

## MA MADAGASCAR

MA05 Antananarivo  
MA01 Antsiranana  
MA02 Fianarantsoa  
MA03 Mahajanga  
MA04 Toamasina  
MA06 Toliara

## MI MALAWI

MI24 Blantyre  
MI02 Chikwawa  
MI03 Chiradzulu  
MI04 Chitipa  
MI06 Dedza  
MI07 Dowa  
MI08 Karonga  
MI09 Kasungu  
MI11 Lilongwe  
MI10 Machinga  
MI12 Mangochi  
MI13 Mchinji  
MI14 Mulanje  
MI25 Mwanza  
MI15 Mzimba  
MI17 Nkhata Bay  
MI18 Nkhokotaka  
MI19 Nsanje  
MI16 Ntcheu  
MI20 Ntchisi  
MI21 Rumphu  
MI22 Salima  
MI05 Thyolo  
MI23 Zomba

## \* MY MALAYSIA

MY01 Johor  
MY02 Kedah  
MY03 Kelantan  
MY15 Labuan  
MY04 Melaka  
MY05 Negeri Sembilan  
MY06 Pahang  
MY07 Perak  
MY08 Perlis  
MY09 Pulau Pinang  
MY16 Sabah  
MY11 Sarawak  
MY12 Selangor  
MY13 Terengganu  
MY14 Wilayah Persekutuan

## MV MALDIVES

MV02 Alif  
MV20 Baa  
MV17 Daalu  
MV14 Faafu  
MV27 Gaafu Alif  
MV28 Gaafu Daalu  
MV07 Haa Alif

# ECOTOX Aquatic Coding Guidelines

MV23	Haa Daalu	MX10	Durango	MO08	Chaouen
MV26	Kaaf u	MX11	Guanajuato	MO09	El Jadida
MV05	Laamu	MX12	Guerrero	MO10	El Kelaa des Srarhna
MV03	Lav i y ani	MX13	Hidalgo	MO11	Er Rachidia
MV12	Meemu	MX14	Jalisco	MO12	Essaouira
MV29	Nav i y ani	MX15	Mexico	MO13	Fes
MV25	Noonu	MX16	Michoacan de Ocampo	MO14	Figuig
MV13	Raa	MX17	Morelos	MO33	Guelmim
MV01	Seenu	MX18	Nay a rit	MO34	If rane
MV24	Shav i y ani	MX19	Nuev o Leon	MO15	Kenitra
MV08	Thaa	MX20	Oaxaca	MO16	Khemisset
MV04	Waav u	MX21	Puebla	MO17	Khenif ra
		MX22	Queretaro de Arteaga	MO18	Khouribga
<b>ML MALI</b>		MX23	Quintana Roo	MO35	Laay oun e
ML01	Bamako	MX24	San Luis Potosi	MO41	Larache
ML02	Gao	MX25	Sinaloa	MO19	Marrakech
ML03	Kay es	MX26	Sonora	MO20	Meknes
ML07	Koulikoro	MX27	Tabasco	MO21	Nador
ML04	Mopti	MX28	Tamaulipas	MO22	Ouarzazate
ML05	Segou	MX29	Tlaxcala	MO23	Oujda
ML06	Sikasso	MX30	Veracruz-Llav e	MO24	Rabat-Sale
ML08	Tombouctou	MX31	Yucatan	MO25	Saf i
		MX32	Zacatecas	MO26	Settat
<b>MT MALTA</b>				MO38	Sidi Kacem
<b>IM MAN, ISLE OF</b>		<b>MQ MIDWAY ISLANDS</b>		MO27	Tanger
<b>RM MARSHALL ISLANDS</b>		<b>MD MOLDOVA</b>		MO36	Tan-Tan
<b>* MB MARTINIQUE</b>		<b>MN MONACO</b>		MO37	Taounate
<b>MR MAURITANIA</b>		MN01	La Condamine	MO39	Taroudannt
MR07	Adrar	MN02	Monaco	MO29	Tata
MR03	Assaba	MN03	Monte-Carlo	MO30	Taza
MR05	Brakna			MO40	Tetouan
MR08	Dakhlet Nouadhibou	<b>MG MONGOLIA</b>		MO32	Tiznit
MR04	Gorgol	MG01	Arhangay	<b>MZ MOZAMBIQUE</b>	
MR10	Guidimaka	MG02	Bay anhongor	MZ01	Cabo Delgado
MR01	Hodh Ech Chargui	MG03	Bay an-Olg i y	MZ02	Gaza
MR02	Hodh El Gharbi	MG21	Bulgan	MZ03	Inhambane
MR12	Inchiri	MG05	Darhan	MZ10	Manica
MR09	Tagant	MG06	Dornod	MZ04	Maputo
MR11	Tiris Zemmour	MG07	Dornogov i	MZ06	Nampula
MR06	Trarza	MG08	Dundgov i	MZ07	Niassa
		MG09	Dzav han	MZ05	Sof ala
<b>MP MAURITIUS</b>		MG22	Erdenet	MZ08	Tete
MP21	Agalega Islands	MG10	Gov i-Altay	MZ09	Zambezia
MP12	Black River	MG11	Henti y	<b>WA NAMIBIA</b>	
MP22	Cargados Carajos	MG12	Hov d	WA01	Bethanien
MP13	Flacq	MG13	Hov sgol	WA03	Boesmanland
MP14	Grand Port	MG14	Omnogov i	WA02	Capriv i Oos
MP15	Moka	MG15	Ov orhangay	WA22	Damaraland
MP16	Pamplemousses	MG16	Selenge	WA04	Gobabis
MP17	Plaines Wilhems	MG17	Suhbaatar	WA05	Grootfontein
MP18	Port Louis	MG18	Tov	WA23	Hereroland Oos
MP19	Riviere du Rempart	MG20	Ulaanbaatar	WA24	Hereroland Wes
MP23	Rodrigues	MG19	Uv s	WA06	Kaokoland
MP20	Sav anne	<b>MW MONTENEGRO</b>		WA20	Karasburg
<b>MF MAYOTTE</b>		<b>MH MONTSERRAT</b>		WA07	Karibib
<b>* MX MEXICO</b>		MH01	Saint Anthony	WA25	Kav ang o
MX01	Aguascalientes	MH02	Saint Georges	WA08	Keetmanshoop
MX02	Baja California	MH03	Saint Peter	WA09	Luderitz
MX03	Baja California Sur			WA10	Maltahohe
MX04	Campeche	<b>MO MOROCCO</b>		WA26	Mariental
MX05	Chiapas	MO01	Agadir	WA27	Namaland
MX06	Chihuahua	MO02	Al Hoceima	WA11	Okahandja
MX07	Coahuila de Zaragoza	MO03	Azilal	WA12	Omaruru
MX08	Colima	MO05	Beni Mellal	WA13	Otjiwarongo
MX09	Distrito Federal	MO04	Ben Slimane	WA14	Outjo
		MO06	Boulemane	WA15	Owambo
		MO07	Casablanca	WA16	Rehoboth
				WA17	Swakopmund
				WA18	Tsumeb
				WA21	Windhoek

# ECOTOX Aquatic Coding Guidelines

## NR NAURU

NR01 Aiwo  
NR02 Anabar  
NR03 Anetan  
NR04 Anibare  
NR05 Baiti  
NR06 Boe  
NR07 Buada  
NR08 Denigomodu  
NR09 Ewa  
NR10 Ijuw  
NR11 Meneng  
NR12 Nibok  
NR13 Uaboe  
NR14 Yaren

## BQ NAVASSA ISLAND

## NP NEPAL

NP01 Bagmati  
NP02 Bheri  
NP03 Dhawalagiri  
NP04 Gandaki  
NP05 Janakpur  
NP06 Karnali  
NP07 Kosi  
NP08 Lumbini  
NP09 Mahakali  
NP10 Mechi  
NP11 Narayani  
NP12 Rapti  
NP13 Sagarmatha  
NP14 Seti

## \* NL NETHERLANDS

NL01 Drenthe  
NL12 Dronen  
NL02 Friesland  
NL03 Gelderland  
NL04 Groningen  
NL14 Lelystad  
NL05 Limburg  
NL06 Noord-Brabant  
NL07 Noord-Holland  
NL08 Overijssel  
NL09 Utrecht  
NL10 Zeeland  
NL13 Zuidelijke IJsselmeerpolders  
NL11 Zuid-Holland

## NT NETHERLANDS ANTILLES

## NC NEW CALEDONIA

## \* NZ NEW ZEALAND

NZ01 Akaroa  
NZ03 Amuri  
NZ04 Ashburton  
NZ07 Bay of Islands  
NZ08 Bruce  
NZ09 Buller  
NZ10 Chatham Islands  
NZ11 Cheviot  
NZ12 Clifton  
NZ13 Clutha  
NZ14 Cook  
NZ16 Dannevirke  
NZ17 Egmont  
NZ18 Eketahuna  
NZ19 Ellesmere

NZ20 Eltham  
NZ21 Eyre  
NZ22 Featherston  
NZ24 Franklin  
NZ26 Golden Bay  
NZ27 Great Barrier Island  
NZ28 Grey  
NZ29 Hauraki Plains  
NZ30 Hawera  
NZ31 Hawke's Bay  
NZ32 Heathcote  
NZD9 Hikorangi  
NZ33 Hobson  
NZ34 Hokianga  
NZ35 Horowhenua  
NZD4 Hurunui  
NZ36 Hutt  
NZ37 Inangahua  
NZ38 Inglewood  
NZ39 Kaikoura  
NZ40 Kairanga  
NZ41 Kiwitea  
NZ43 Lake  
NZ45 Mackenzie  
NZ46 Marlborough  
NZE1 Manaia  
NZ47 Manawatu  
NZ48 Mangonui  
NZ49 Maniototo  
NZ50 Marlborough  
NZ51 Masterton  
NZ52 Matamata  
NZ53 Mount Herbert  
NZ54 Ohinemuri  
NZ55 Oporiki  
NZ56 Oroua  
NZ57 Otamatea  
NZ58 Otorohanga  
NZ59 Oxford  
NZ60 Pahiatua  
NZ61 Paparua  
NZ63 Patea  
NZ65 Piako  
NZ66 Pohangina  
NZ67 Raglan  
NZ68 Rangiora  
NZ69 Rangitikei  
NZ70 Rodney  
NZ71 Rotorua  
NZE2 Runanga  
NZE3 Saint Kilda  
NZD5 Silverpeaks  
NZ72 Southland  
NZ73 Stewart Island  
NZ74 Stratford  
NZD6 Strathallan  
NZ76 Taranaki  
NZ77 Taumarunui  
NZ78 Taupo  
NZ79 Tauranga  
NZE4 Thames-Coromandel  
NZ81 Tuapeka  
NZ82 Vincent  
NZ83 Waiapu  
NZD8 Waiheke  
NZ84 Waiheke  
NZ85 Waikato  
NZ86 Waikohu  
NZ88 Waimairi  
NZ89 Waimarino  
NZ90 Waimate  
NZ91 Waimate West

NZ92 Waimea  
NZ93 Waipa  
NZ95 Waipawa  
NZ96 Waipukurau  
NZ97 Wairarapa South  
NZ98 Wairua  
NZ99 Wairoa  
NZA4 Waitaki  
NZA6 Waitomo  
NZA8 Waitotara  
NZE6 Wallace  
NZB2 Wanganui  
NZE5 Waverley  
NZB3 Westland  
NZB4 Whakatane  
NZA1 Whangarei  
NZA2 Whangaroa  
NZA3 Woodville

## NU NICARAGUA

NU01 Boaco  
NU02 Carazo  
NU03 Chinandega  
NU04 Chontales  
NU05 Esteli  
NU06 Granada  
NU07 Jinotega  
NU08 Leon  
NU09 Madriz  
NU10 Managua  
NU11 Masaya  
NU12 Matagalpa  
NU13 Nueva Segovia  
NU14 Rio San Juan  
NU15 Rivas  
NU16 Zelaya

## NG NIGER

NG01 Agadez  
NG02 Diffa  
NG03 Dosso  
NG04 Maradi  
NG05 Niamey  
NG06 Tahoua  
NG07 Zinder

## NI NIGERIA

NI34 Abia  
NI11 Abuja Capital Territory  
NI35 Adamawa  
NI21 Akwa Ibom  
NI25 Anambra  
NI06 Bauchi  
NI26 Benue  
NI27 Borno  
NI22 Cross River  
NI36 Delta  
NI37 Edo  
NI38 Enugu  
NI28 Imo  
NI39 Jigawa  
NI23 Kaduna  
NI29 Kano  
NI24 Katsina  
NI40 Kebbi  
NI41 Kogi  
NI30 Kwara  
NI05 Lagos  
NI31 Niger  
NI16 Ogun  
NI17 Ondo

# ECOTOX Aquatic Coding Guidelines

NI42 Osun	PP02 Gulf	RPA1 Angeles
NI32 Oyo	PP12 Madang	RP06 Antique
NI19 Plateau	PP13 Manus	RPG8 Aurora
NI10 Rivers	PP03 Milne Bay	RPA2 Bacolod
NI33 Sokoto	PP14 Morobe	RPA3 Bago
NI43 Taraba	PP20 National Capital	RPA4 Baguio
NI44 Yobe	PP15 New Ireland	RPA5 Bais
<b>NE NIUE</b>	PP04 Northern	RP22 Basilan
<b>NF NORFOLK ISLAND</b>	PP07 North Solomons	RPA6 Basilan City
<b>CQ NORTHERN MARIANA ISLANDS</b>	PP18 Sandaun	RP07 Bataan
<b>* NO NORWAY</b>	PP05 Southern Highlands	RP08 Batanes
NO01 Akershus	PP06 Western	RP09 Batangas
NO02 Aust-Agder	PP16 Western Highlands	RPA7 Batangas City
NO04 Buskerud	PP17 West New Britain	RP10 Benguet
NO05 Finnmark	<b>PF PARACEL ISLANDS</b>	RP11 Bohol
NO06 Hedmark	<b>PA PARAGUAY</b>	RP12 Bukidnon
NO07 Hordaland	PA18 Alto Paraguay	RP13 Bulacan
NO08 More og Romsdal	PA01 Alto Parana	RPA8 Butuan
NO09 Nordland	PA02 Amambay	RPA9 Cabanatuan
NO10 Nord-Trondelag	PA03 Boqueron	RPB1 Cadiz
NO11 Oppland	PA04 Caaguazu	RP14 Cagay an
NO12 Oslo	PA05 Caazapa	RPB2 Cagayan de Oro
NO13 Ostfold	PA19 Canindey u	RPB3 Calbay og
NO14 Rogaland	PA06 Central	RPB4 Caloocan
NO15 Sogn og Fjordane	PA20 Chaco	RP15 Camarines Norte
NO16 Sor-Trondelag	PA07 Concepcion	RP16 Camarines Sur
NO17 Telemark	PA08 Cordillera	RP17 Camiguin
NO18 Troms	PA10 Guaira	RPB5 Canlaon
NO19 Vest-Agder	PA11 Itapua	RP18 Capiz
NO20 Vestfold	PA12 Misiones	RP19 Catanduanes
<b>MU OMAN</b>	PA13 Neembucu	RP20 Cavite
<b>PK PAKISTAN</b>	PA21 Nueva Asuncion	RPB6 Cavite City
PK06 Azad Kashmir	PA15 Paraguari	RP21 Cebu
PK02 Balochistan	PA16 Presidente Hayes	RPB7 Cebu City
PK01 Federally Administered Tribal Areas	PA17 San Pedro	RPB8 Cotabato
PK08 Islamabad	<b>PE PERU</b>	RPB9 Dagupan
PK07 Northern Areas	PE01 Amazonas	RPC1 Danao
PK03 North-West Frontier	PE02 Ancash	RPC2 Dapitan
PK04 Punjab	PE03 Apurimac	RP24 Davao
PK05 Sindh	PE04 Arequipa	RPC3 Davao City
<b>LQ PALMYRA ATOLL</b>	PE05 Ayacucho	RP25 Davao del Sur
<b>* PM PANAMA</b>	PE06 Cajamarca	RP26 Davao Oriental
PM01 Bocas del Toro	PE07 Callao	RPC4 Dipolog
PM02 Chiriqui	PE08 Cusco	RPC5 Dumaguete
PM03 Cocle	PE09 Huancavelica	RP23 Eastern Samar
PM04 Colon	PE10 Huanuco	RPC6 General Santos
PM05 Darien	PE11 Ica	RPC7 Gingoog
PM06 Herrera	PE12 Junin	RP27 Ifugao
PM07 Los Santos	PE13 La Libertad	RPC8 Iligan
PM08 Panama	PE14 Lambayeque	RP28 Ilocos Norte
PM09 San Blas	PE15 Lima	RP29 Ilocos Sur
PM10 Veraguas	PE16 Loreto	RP30 Iloilo
<b>PP PAPUA NEW GUINEA</b>	PE17 Madre de Dios	RPC9 Iloilo City
PP01 Central	PE18 Moquegua	RPD1 Iriga
PP08 Chimbu	PE19 Pasco	RP31 Isabela
PP09 Eastern Highlands	PE20 Piura	RP32 Kalinga-Apayao
PP10 East New Britain	PE21 Puno	RPD2 La Carlota
PP11 East Sepik	PE22 San Martin	RP33 Laguna
PP19 Enga	PE23 Tacna	RP34 Lanao del Norte
	PE24 Tumbes	RP35 Lanao del Sur
	PE25 Ucayali	RPD3 Laoag
	<b>RP PHILIPPINES</b>	RPD4 Lapu-Lapu
	RP01 Abra	RP36 La Union
	RP02 Agusan del Norte	RPD5 Legaspi
	RP03 Agusan del Sur	RP37 Leyte
	RP04 Aklan	RPD6 Lipa
	RP05 Albay	RPD7 Lucena
		RP56 Maguindanao
		RPD8 Mandaue
		RPD9 Manila
		RPE1 Marawi
		RP38 Marinduque

# ECOTOX Aquatic Coding Guidelines

RP39 Masbate  
 RP40 Mindoro Occidental  
 RP41 Mindoro Oriental  
 RP42 Misamis Occidental  
 RP43 Misamis Oriental  
 RP44 Mountain  
 RPE2 Naga  
 RPH3 Negros Occidental  
 RP46 Negros Oriental  
 RP57 North Cotabato  
 RP67 Northern Samar  
 RP47 Nueva Ecija  
 RP48 Nueva Vizcaya  
 RPE3 Olongapo  
 RPE4 Ormoc  
 RPE5 Oroquieta  
 RPE6 Ozamis  
 RPE7 Pagadian  
 RP49 Palawan  
 RPE8 Palayan  
 RP50 Pampanga  
 RP51 Pangasinan  
 RPE9 Pasay  
 RPF1 Puerto Princesa  
 RPH2 Quezon  
 RPF2 Quezon City  
 RP68 Quirino  
 RP53 Rizal  
 RP54 Romblon  
 RPF3 Roxas  
 RP55 Samar  
 RPF4 San Carlos, Negros Occidental  
 RPF5 San Carlos, Pangasinan  
 RPF6 San Jose  
 RPF7 San Pablo  
 RPF8 Silay  
 RP69 Siquijor  
 RP58 Sorsogon  
 RP70 South Cotabato  
 RP59 Southern Leyte  
 RP71 Sultan Kudarat  
 RP60 Sulu  
 RPF9 Surigao  
 RP61 Surigao del Norte  
 RP62 Surigao del Sur  
 RPG1 Tacloban  
 RPG2 Tagaytay  
 RPG3 Tagbilaran  
 RPG4 Tanguib  
 RP63 Tarlac  
 RP72 Tawitawi  
 RPG5 Toledo  
 RPG6 Trece Martires  
 RP64 Zambales  
 RPG7 Zamboanga  
 RP65 Zamboanga del Norte  
 RP66 Zamboanga del Sur

## **PC PITCAIRN ISLANDS**

### **\* PL POLAND**

PL23 Biala Podlaska  
 PL24 Bialystok  
 PL25 Bielsko  
 PL26 Bydgoszcz  
 PL27 Chelm  
 PL28 Ciechanow  
 PL29 Czestochowa  
 PL30 Elblag  
 PL31 Gdansk  
 PL32 Gorzow

PL33 Jelenia Gora  
 PL34 Kalisz  
 PL35 Katowice  
 PL36 Kielce  
 PL37 Konin  
 PL38 Koszalin  
 PL39 Krakow  
 PL40 Krosno  
 PL41 Legnica  
 PL42 Leszno  
 PL43 Lodz  
 PL44 Lomza  
 PL45 Lublin  
 PL46 Nowy Sacz  
 PL47 Olsztyn  
 PL48 Opole  
 PL49 Ostroleka  
 PL50 Pila  
 PL51 Piotrkow  
 PL52 Plock  
 PL53 Poznan  
 PL54 Przemyśl  
 PL55 Radom  
 PL56 Rzeszow  
 PL57 Siedlce  
 PL58 Sieradz  
 PL59 Skierniewice  
 PL60 Slupsk  
 PL61 Suwalki  
 PL62 Szczecin  
 PL63 Tarnobrzeg  
 PL64 Tarnow  
 PL65 Torun  
 PL66 Walbrzych  
 PL67 Warszawa  
 PL68 Wloclawek  
 PL69 Wroclaw  
 PL70 Zamosc  
 PL71 Zielona Gora

### **PO PORTUGAL**

PO02 Aveiro  
 PO23 Azores  
 PO03 Beja  
 PO04 Braga  
 PO05 Braganca  
 PO06 Castelo Branco  
 PO07 Coimbra  
 PO08 Evora  
 PO09 Faro  
 PO11 Guarda  
 PO13 Leiria  
 PO14 Lisboa  
 PO10 Madeira  
 PO16 Portalegre  
 PO17 Porto  
 PO18 Santarem  
 PO19 Setubal  
 PO20 Viana do Castelo  
 PO21 Vila Real  
 PO22 Viseu

### **\* RQ PUERTO RICO**

### **QA QATAR**

### **RE REUNION**

### **RO ROMANIA**

RO01 Alba  
 RO02 Arad

RO03 Arges  
 RO04 Bacau  
 RO05 Bihor  
 RO06 Bistrita-Nasaud  
 RO07 Botosani  
 RO08 Braila  
 RO09 Brasov  
 RO10 Bucuresti  
 RO11 Buzau  
 RO41 Calarasi  
 RO12 Caras-Severin  
 RO13 Cluj  
 RO14 Constanta  
 RO15 Covasna  
 RO16 Dimbovita  
 RO17 Dolj  
 RO18 Galati  
 RO19 Gorj  
 RO42 Giurgiu  
 RO20 Harghita  
 RO21 Hunedoara  
 RO22 Ialomita  
 RO23 Iasi  
 RO25 Maramures  
 RO26 Mehedinti  
 RO27 Mures  
 RO28 Neamt  
 RO29 Olt  
 RO30 Prahova  
 RO31 Salaj  
 RO32 Satu Mare  
 RO33 Sibiu  
 RO34 Suceava  
 RO35 Teleorman  
 RO36 Timis  
 RO37 Tulcea  
 RO38 Vaslui  
 RO39 Vilcea  
 RO40 Vrancea

### **\* RS RUSSIA**

### **RW RWANDA**

RW01 Butare  
 RW02 Byumba  
 RW03 Cyangugu  
 RW04 Gikongoro  
 RW05 Gisenyi  
 RW06 Gitarama  
 RW07 Kibungo  
 RW08 Kibuye  
 RW09 Kigali  
 RW10 Ruhengeri

### **SC ST. KITTS AND NEVIS**

SC01 Christ Church Nichola Town  
 SC02 Saint Anne Sandy Point  
 SC03 Saint George Basseterre  
 SC04 Saint George Gingerland  
 SC05 Saint James Windward  
 SC06 Saint John Capisterre  
 SC07 Saint John Figtree  
 SC08 Saint Mary Cayon  
 SC09 Saint Paul Capisterre  
 SC10 Saint Paul Charlestown  
 SC11 Saint Peter Basseterre  
 SC12 Saint Thomas Lowland  
 SC13 Saint Thomas Middle Island  
 SC15 Trinity Palmetto Point

### **SH ST. HELENA**

SH01 Ascension  
 SH02 Saint Helena

# ECOTOX Aquatic Coding Guidelines

SH03 Tristan da Cunha	SE01 Anse aux Pins	* SP SPAIN
ST ST. LUCIA	SE02 Anse Boileau	SP51 Andalucia
ST01 Anse-la-Ray e	SE03 Anse Etoile	SP52 Aragon
ST03 Castries	SE04 Anse Louis	SP34 Asturias
ST04 Choiseul	SE05 Anse Royale	SP53 Canarias
ST02 Dauphin	SE06 Baie Lazare	SP39 Cantabria
ST05 Dennery	SE07 Baie Sainte Anne	SP54 Castilla-La Mancha
ST06 Gros-Islet	SE08 Beau Vallon	SP55 Castilla y Leon
ST07 Laborie	SE09 Bel Air	SP56 Cataluna
ST08 Micoud	SE10 Bel Ombre	SP57 Extremadura
ST11 Praslin	SE11 Cascade	SP58 Galicia
ST09 Soufriere	SE12 Glacis	SP07 Islas Baleares
ST10 Vieux-Fort	SE13 Grand' Anse (Mahe)	SP27 La Rioja
<b>SB ST. PIERRE AND MIQUELON</b>	SE14 Grand' Anse (Praslin)	SP29 Madrid
<b>VC ST. VINCENT AND THE GRENADINES</b>	SE15 La Digue	SP31 Murcia
VC01 Charlotte	SE16 La Riviere Anglaise	SP32 Navarra
VC06 Grenadines	SE17 Mont Buxton	SP59 Pais Vasco
VC02 Saint Andrew	SE18 Mont Fleuri	SP60 Valenciana
VC03 Saint David	SE19 Plaisance	
VC04 Saint George	SE20 Pointe La Rue	<b>PG SPRATLY ISLANDS</b>
VC05 Saint Patrick	SE21 Port Glaud	<b>CE SRI LANKA</b>
<b>SM SAN MARINO</b>	SE22 Saint Louis	CE01 Amparai
SM01 Acquaviva	SE23 Takamaka	CE02 Anuradhapura
SM06 Borgo Maggiore	<b>SL SIERRA LEONE</b>	CE03 Badulla
SM02 Chiesanuova	SL01 Eastern	CE04 Batticaloa
SM03 Domagnano	SL02 Northern	CE23 Colombo
SM04 Faetano	SL03 Southern	CE06 Galle
SM05 Fiorentino	SL04 Western Area	CE24 Gampaha
SM08 Monte Giardino	<b>SN SINGAPORE</b>	CE07 Hambantota
SM07 San Marino	<b>* LO SLOVAKIA</b>	CE25 Jaffna
SM09 Serravalle	<b>* SI SLOVENIA</b>	CE09 Kalutara
<b>TP SAO TOME AND PRINCIPE</b>	<b>BP SOLOMON ISLANDS</b>	CE10 Kandy
TP01 Principe	BP05 Central	CE11 Kegalla
TP02 Sao Tome	BP06 Guadalcanal	CE12 Kurunegala
<b>SA SAUDI ARABIA</b>	BP07 Isabel	CE26 Mannar
SA02 Al Bahah	BP08 Makira	CE14 Matale
SA15 Al Hudud ash Shamaliyah	BP03 Malaita	CE15 Matara
SA03 Al Jawf	BP09 Temotu	CE16 Moneragala
SA05 Al Madinah	BP04 Western	CE27 Mullaitivu
SA08 Al Qasim	<b>SO SOMALIA</b>	CE17 Nuwara Eliya
SA09 Al Qurayyat	SO01 Bakool	CE18 Polonnaruwa
SA10 Ar Riyad	SO02 Banaadir	CE19 Puttalam
SA06 Ash Sharqiyah	SO03 Bari	CE20 Ratnapura
SA11 'Asir	SO04 Bay	CE21 Trincomalee
SA13 Ha'il	SO05 Galguduud	CE28 Vavuniya
SA17 Jizan	SO06 Gedo	<b>SU SUDAN</b>
SA14 Makkah	SO07 Hiiraan	SU26 A'ali an Nil
SA16 Najran	SO08 Jubbada Dhexe	SU28 Al Istiwa'iyah
SA19 Tabuk	SO09 Jubbada Hoose	SU29 Al Khartum
<b>SG SENEGAL</b>	SO10 Mudug	SU27 Al Wusta
SG01 Dakar	SO11 Nugaal	SU30 Ash Shamaliyah
SG03 Diourbel	SO12 Sanaag	SU31 Ash Sharqiyah
SG09 Fatick	SO13 Shabeellaha Dhexe	SU32 Bahr al Ghazal
SG10 Kaolack	SO14 Shabeellaha Hoose	SU33 Darfur
SG11 Kolda	SO15 Togdheer	SU34 Kurdufan
SG08 Louga	SO16 Woqooyi Galbeed	<b>NS SURINAME</b>
SG04 Saint-Louis	<b>SF SOUTH AFRICA</b>	NS10 Brokopondo
SG05 Tambacounda	SF01 Cape Province	NS11 Commewijne
SG07 Thies	SF02 Natal	NS12 Coronie
SG12 Ziguinchor	SF03 Orange Free State	NS13 Marowijne
<b>SR SERBIA</b>	SF04 Transvaal	NS14 Nickerie
<b>SE SEYCHELLES</b>	<b>SX SOUTH GEORGIA AND THE SOUTH SANDWICH ISLANDS</b>	NS15 Para
		NS16 Paramaribo
		NS17 Saramacca
		NS18 Sipaliwini
		NS19 Wanica
		<b>SV SVALBARD</b>

# ECOTOX Aquatic Coding Guidelines

<b>WZ SWAZILAND</b>	SY 10 Hamah	TH66 Phatthalung
WZ01 Hhohho	SY 11 Hims	TH41 Phay ao
WZ02 Lubombo	SY 12 Idlib	TH14 Phetchabun
WZ03 Manzini	SY 08 Rif Dimashq	TH56 Phetchaburi
WZ05 Praslin	SY 14 Tartus	TH13 Phichit
WZ04 Shiselweni		TH12 Phitsanulok
	<b>TI TAJIKISTAN</b>	TH36 Phra Nakhon Si Ayutthaya
<b>* SW SWEDEN</b>	<b>TZ TANZANIA</b>	TH07 Phrae
SW01 Alvsborgs Lan	TZ01 Arusha	TH62 Phuket
SW02 Blekinge Lan	TZ23 Dar es Salaam	TH45 Prachin Buri
SW03 Gavleborgs Lan	TZ03 Dodoma	TH57 Prachuap Khiri Khan
SW04 Goteborgs och Bohus Lan	TZ04 Iringa	TH59 Ranong
SW05 Gotlands Lan	TZ05 Kigoma	TH52 Ratchaburi
SW06 Hallands Lan	TZ06 Kilimanjaro	TH47 Rayong
SW07 Jamtlands Lan	TZ07 Lindi	TH25 Roi Et
SW08 Jonkopings Lan	TZ08 Mara	TH20 Sakon Nakhon
SW09 Kalmar Lan	TZ09 Mbeya	TH42 Samut Prakan
SW10 Kopparbergs Lan	TZ10 Morogoro	TH55 Samut Sakhon
SW11 Kristianstads Lan	TZ11 Mtwara	TH54 Samut Songkhram
SW12 Kronobergs Lan	TZ12 Mwanza	TH37 Saraburi
SW13 Malmohus Lan	TZ13 Pemba North	TH67 Satun
SW14 Norrbottens Lan	TZ20 Pemba South	TH33 Sing Buri
SW15 Orebro Lan	TZ02 Pwani	TH30 Sisaket
SW16 Ostergotlands Lan	TZ24 Rukwa	TH68 Songkhla
SW17 Skaraborgs Lan	TZ14 Ruvuma	TH09 Sukhothai
SW18 Sodermanlands Lan	TZ15 Shinyanga	TH51 Suphan Buri
SW26 Stockholms Lan	TZ16 Singida	TH60 Surat Thani
SW21 Uppsala Lan	TZ17 Tabora	TH29 Surin
SW22 Varmlands Lan	TZ18 Tanga	TH08 Tak
SW23 Vasterbottens Lan	TZ21 Zanzibar Central/South	TH65 Trang
SW24 Vasternorrlands Lan	TZ22 Zanzibar North	TH49 Trat
SW25 Vastmanlands Lan	TZ25 Zanzibar Urban/West	TH71 Ubon Ratchathani
	TZ19 Ziwa Magharibi	TH19 Udon Thani
<b>* SZ SWITZERLAND</b>	<b>TH THAILAND</b>	TH15 Uthai Thani
SZ01 Aargau	TH35 Ang Thong	TH10 Uttaradit
SZ02 Ausser-Rhoden	TH28 Buriram	TH70 Yala
SZ03 Basel-Landschaft	TH44 Chachoengsao	TH72 Yasothorn
SZ04 Basel-Stadt	TH32 Chai Nat	
SZ05 Bern	TH26 Chaiphum	<b>TO TOGO</b>
SZ06 Fribourg	TH48 Chanthaburi	TO01 Amlame
SZ07 Geneve	TH02 Chiang Mai	TO02 Aneho
SZ08 Glarus	TH03 Chiang Rai	TO03 Atakpame
SZ09 Graubunden	TH46 Chon Buri	TO15 Badou
SZ10 Inner-Rhoden	TH58 Chumphon	TO04 Bafilo
SZ26 Jura	TH23 Kalasin	TO05 Bassar
SZ11 Luzern	TH11 Kamphaeng Phet	TO06 Dapaong
SZ12 Neuchatel	TH50 Kanchanaburi	TO07 Kante
SZ13 Nidwalden	TH22 Khon Kaen	TO08 Klouto
SZ14 Obwalden	TH63 Krabi	TO14 Kpagouda
SZ15 Sankt Gallen	TH40 Krung Thep	TO09 Lama-Kara
SZ16 Schaffhausen	TH06 Lampang	TO10 Lome
SZ17 Schwyz	TH05 Lamphun	TO11 Mango
SZ18 Solothurn	TH18 Loei	TO12 Niamtougou
SZ19 Thurgau	TH34 Lop Buri	TO13 Notse
SZ20 Ticino	TH01 Mae Hong Son	TO16 Sotouboua
SZ21 Uri	TH24 Maha Sarakham	TO17 Tabligbo
SZ22 Valais	TH43 Nakhon Nayok	TO19 Tchamba
SZ23 Vaud	TH53 Nakhon Pathom	TO20 Tchaoudjo
SZ24 Zug	TH21 Nakhon Phanom	TO18 Tsevie
SZ25 Zurich	TH27 Nakhon Ratchasima	TO21 Vogan
	TH16 Nakhon Sawan	
<b>SY SYRIA</b>	TH64 Nakhon Si Thammarat	<b>TL TOKELAU</b>
SY01 Al Hasakah	TH04 Nan	
SY02 Al Ladhigiyah	TH31 Narathiwat	<b>TN TONGA</b>
SY03 Al Qunaytirah	TH17 Nong Khai	TN01 Ha'apai
SY04 Ar Raqqa	TH38 Nonthaburi	TN02 Tongatapu
SY05 As Suwayda'	TH39 Pathum Thani	TN03 Vava'u
SY06 Dar'a	TH69 Pattani	
SY07 Dayr az Zawr	TH61 Phangnga	<b>TD TRINIDAD AND TOBAGO</b>
SY13 Dimashq		TD01 Arima
SY09 Halab		TD02 Caroni

# ECOTOX Aquatic Coding Guidelines

TD03 Mayaro  
TD04 Nariva  
TD05 Port-of-Spain  
TD06 Saint Andrew  
TD07 Saint David  
TD08 Saint George  
TD09 Saint Patrick  
TD10 San Fernando  
TD11 Tobago  
TD12 Victoria

## TE TROMELIN ISLAND

## PS TRUST TERRITORY OF THE (PALAU) PACIFIC ISLANDS

## TS TUNISIA

TS14 Al Kaf  
TS15 Al Mahdiah  
TS16 Al Munastir  
TS02 Al Qasrayn  
TS03 Al Qayrawan  
TS26 Aryanah  
TS17 Bajah  
TS18 Banzart  
TS27 Bin 'Arus  
TS06 Jundubah  
TS28 Madanin  
TS19 Nabul  
TS29 Qabis  
TS10 Qafsa  
TS31 Qibili  
TS32 Safaqis  
TS33 Sidi Bu Zayd  
TS22 Silyanah  
TS23 Susah  
TS34 Tatawin  
TS35 Tawzar  
TS36 Tunis  
TS37 Zaghwah

## TU TURKEY

TU01 Adana  
TU02 Adiyaman  
TU03 Afyon  
TU04 Agri  
TU75 Aksaray  
TU05 Amasya  
TU68 Ankara  
TU07 Antalya  
TU08 Artvin  
TU09 Aydin  
TU10 Balikesir  
TU76 Batman  
TU77 Bayburt  
TU11 Bilecik  
TU12 Bingol  
TU13 Bitlis  
TU14 Bolu  
TU15 Burdur  
TU16 Bursa  
TU17 Canakkale  
TU18 Cankiri  
TU19 Corum  
TU20 Denizli  
TU21 Diyarbakir  
TU22 Edirne  
TU23 Elazig  
TU24 Erzincan  
TU25 Erzurum  
TU26 Eskisehir

TU27 Gaziantep  
TU28 Giresun  
TU69 Gumushane  
TU70 Hakkari  
TU31 Hatay  
TU32 Icel  
TU33 Isparta  
TU34 Istanbul  
TU35 Izmir  
TU46 Kahraman Maras  
TU78 Karaman  
TU36 Kars  
TU37 Kastamonu  
TU38 Kayseri  
TU79 Kirikkale  
TU39 Kirklareli  
TU40 Kirsehir  
TU41 Kocaeli  
TU71 Konya  
TU43 Kutahya  
TU44 Malatya  
TU45 Manisa  
TU72 Mardin  
TU48 Mugla  
TU49 Mus  
TU50 Nevsehir  
TU73 Nigde  
TU52 Ordu  
TU53 Rize  
TU54 Sakarya  
TU55 Samsun  
TU74 Siirt  
TU57 Sinop  
TU80 Sirmak  
TU58 Sivass  
TU59 Tekirdag  
TU60 Tokat  
TU61 Trabzon  
TU62 Tunceli  
TU63 Urfah  
TU64 Usak  
TU65 Van  
TU66 Yozgat  
TU67 Zonguldak

## TX TURKMENISTAN

## TK TURKS AND CAICOS ISLANDS

## TV TUVALU

## UG UGANDA

UG05 Busoga  
UG18 Central  
UG20 Eastern  
UG08 Karamoja  
UG21 Nile  
UG22 North Buganda  
UG23 Northern  
UG12 South Buganda  
UG24 Southern  
UG25 Western

## \* UP UKRAINE

UP01 Cherkas'ka Oblast'  
UP02 Chernihiv's'ka Oblast'  
UP03 Chernivets'ka Oblast'  
UP04 Dnipropetrov's'ka Oblast'  
UP05 Donetsk'ka Oblast'  
UP06 Ivano-Frankiv's'ka Oblast'

UP07 Kharkiv's'ka Oblast'  
UP08 Kherson's'ka Oblast'  
UP09 Khmel'nyts'ka Oblast'  
UP10 Kirovohrads'ka Oblast'  
UP11 Krym, Respublika  
UP12 Kyiv, Misto  
UP13 Kyiv's'ka Oblast'  
UP14 Luhans'ka Oblast'  
UP15 L'viv's'ka Oblast'  
UP16 Mykolayiv's'ka Oblast'  
UP17 Odes'ka Oblast'  
UP18 Poltav's'ka Oblast'  
UP19 Rivnens'ka Oblast'  
UP20 Sevastopol', Misto  
UP21 Sums'ka Oblast'  
UP22 Ternopil's'ka Oblast'  
UP23 Vinnyts'ka Oblast'  
UP24 Volyn's'ka Oblast'  
UP25 Zakarpats'ka Oblast'  
UP26 Zaporiz'ka Oblast'  
UP27 Zhytomyrs'ka Oblast'

## TC UNITED ARAB EMIRATES

TC01 Abu Zaby  
TC02 'Ajman  
TC04 Al Fujayrah  
TC06 Ash Shariqah  
TC03 Dubayy  
TC05 Ra's al Khaymah  
TC07 Umm al Qaywayn

## \* UK UNITED KINGDOM

UK01 Avon  
UK02 Bedford  
UK03 Berkshire  
UK04 Buckingham  
UK05 Cambridge  
UK06 Cheshire  
UK07 Cleveland  
UK08 Cornwall  
UK09 Cumbria  
UK10 Derby  
UK11 Devon  
UK12 Dorset  
UK13 Durham  
UK14 East Sussex  
UK15 Essex  
UK16 Gloucester  
UK17 Greater London  
UK18 Greater Manchester  
UK19 Hampshire  
UK20 Hereford and Worcester  
UK21 Hertford  
UK22 Humberside  
UK23 Isle of Wight  
UK24 Kent  
UK25 Lancashire  
UK26 Leicester  
UK27 Lincoln  
UK28 Merseyside  
UK29 Norfolk  
UK31 Northampton  
UK32 Northumberland  
UK30 North Yorkshire  
UK33 Nottingham  
UK34 Oxford  
UK35 Shropshire  
UK36 Somerset  
UK37 South Yorkshire  
UK38 Stafford  
UK39 Suffolk  
UK40 Surrey

# ECOTOX Aquatic Coding Guidelines

UK41 Tyne and Wear  
 UK42 Warwick  
 UK43 West Midlands  
 UK44 West Sussex  
 UK45 West Yorkshire  
 UK46 Wiltshire  
 UK52 Antrim  
 UK53 Ards  
 UK54 Armagh  
 UK55 Ballymena  
 UK56 Ballymoney  
 UK57 Banbridge  
 UK58 Belfast  
 UK59 Carrickfergus  
 UK60 Castlereagh  
 UK61 Coleraine  
 UK62 Cookstown  
 UK63 Craigavon  
 UK64 Down  
 UK65 Dungannon  
 UK66 Fermanagh  
 UK67 Larne  
 UK68 Limavady  
 UK69 Lisburn  
 UK70 Londonderry  
 UK71 Magherafelt  
 UK72 Moyale  
 UK73 Newry and Mourne  
 UK74 Newtownabbey  
 UK75 North Down  
 UK76 Omagh  
 UK77 Strabane  
 UK78 Borders  
 UK79 Central  
 UK80 Dumfries and Galloway  
 UK81 Fife  
 UK82 Grampian  
 UK83 Highland  
 UK84 Lothian  
 UK85 Orkney  
 UK86 Shetland  
 UK87 Strathclyde  
 UK88 Tayside  
 UK89 Western Isles  
 UK90 Clwyd  
 UK91 Dyfed  
 UK92 Gwent  
 UK93 Gwynedd  
 UK94 Mid Glamorgan  
 UK95 Powys  
 UK96 South Glamorgan  
 UK97 West Glamorgan

## \* US UNITED STATES

\* US01 Alabama  
 \* US02 Alaska  
 \* US04 Arizona  
 \* US05 Arkansas  
 \* US06 California  
 \* US08 Colorado  
 \* US09 Connecticut  
 \* US10 Delaware  
 \* US11 District of Columbia  
 \* US12 Florida  
 \* US13 Georgia  
 \* US15 Hawaii  
 \* US16 Idaho  
 \* US17 Illinois  
 \* US18 Indiana  
 \* US19 Iowa  
 \* US20 Kansas  
 \* US21 Kentucky

\* US22 Louisiana  
 \* US23 Maine  
 \* US24 Maryland  
 \* US25 Massachusetts  
 \* US26 Michigan  
 \* US27 Minnesota  
 \* US28 Mississippi  
 \* US29 Missouri  
 \* US30 Montana  
 \* US31 Nebraska  
 \* US32 Nevada  
 \* US33 New Hampshire  
 \* US34 New Jersey  
 \* US35 New Mexico  
 \* US36 New York  
 \* US37 North Carolina  
 \* US38 North Dakota  
 \* US39 Ohio  
 \* US40 Oklahoma  
 \* US41 Oregon  
 \* US42 Pennsylvania  
 \* US44 Rhode Island  
 \* US45 South Carolina  
 \* US46 South Dakota  
 \* US47 Tennessee  
 \* US48 Texas  
 \* US49 Utah  
 \* US50 Vermont  
 \* US51 Virginia  
 \* US53 Washington  
 \* US54 West Virginia  
 \* US55 Wisconsin  
 \* US56 Wyoming

## UY URUGUAY

UY01 Artigas  
 UY02 Canelones  
 UY03 Cerro Largo  
 UY04 Colonia  
 UY05 Durazno  
 UY06 Flores  
 UY07 Florida  
 UY08 Lavalleja  
 UY09 Maldonado  
 UY10 Montevideo  
 UY11 Paysandu  
 UY12 Rio Negro  
 UY13 Rivera  
 UY14 Rocha  
 UY15 Salto  
 UY16 San Jose  
 UY17 Soriano  
 UY18 Tacuarembó  
 UY19 Treinta y Tres

## UZ UZBEKISTAN

## NH VANUATU

NH05 Ambrym  
 NH06 Aoba/Maewo  
 NH07 Banks/Torres  
 NH08 Efate  
 NH09 Epi  
 NH10 Malakula  
 NH11 Paama  
 NH12 Pentecote  
 NH13 Santo/Malo  
 NH14 Shepherd  
 NH15 Tafea

## VT VATICAN CITY

## VE VENEZUELA

VE01 Amazonas  
 VE02 Anzoategui  
 VE03 Apure  
 VE04 Aragua  
 VE05 Barinas  
 VE06 Bolívar  
 VE07 Carabobo  
 VE08 Cojedes  
 VE09 Delta Amacuro  
 VE24 Dependencias Federales  
 VE10 Distrito Federal  
 VE11 Falcon  
 VE12 Guarico  
 VE13 Lara  
 VE14 Merida  
 VE15 Miranda  
 VE16 Monagas  
 VE17 Nueva Esparta  
 VE18 Portuguesa  
 VE19 Sucre  
 VE20 Tachira  
 VE21 Trujillo  
 VE22 Yaracuy  
 VE23 Zulia

## VM VIETNAM

VM43 An Giang  
 VM53 Ba Ria-Vung Tau  
 VM02 Bac Thai  
 VM03 Ben Tre  
 VM54 Binh Dinh  
 VM55 Binh Thuan  
 VM56 Can Tho  
 VM05 Cao Bang  
 VM44 Dac Lac  
 VM45 Dong Nai  
 VM46 Dong Thap  
 VM57 Gia Lai  
 VM11 Ha Bac  
 VM58 Ha Giang  
 VM51 Ha Noi  
 VM59 Ha Tay  
 VM60 Ha Tinh  
 VM12 Hai Hung  
 VM13 Hai Phong  
 VM52 Ho Chi Minh  
 VM61 Hoa Binh  
 VM62 Khanh Hoa  
 VM47 Kien Giang  
 VM63 Kon Tum  
 VM22 Lai Chau  
 VM23 Lam Dong  
 VM39 Lang Son  
 VM64 Lao Cai  
 VM24 Long An  
 VM48 Minh Hai  
 VM65 Nam Ha  
 VM66 Nghe An  
 VM67 Ninh Binh  
 VM68 Ninh Thuan  
 VM69 Phu Yen  
 VM70 Quang Binh  
 VM29 Quang Nam-Da Nang  
 VM71 Quang Ngai  
 VM30 Quang Ninh  
 VM72 Quang Tri  
 VM73 Soc Trang  
 VM49 Song Be  
 VM32 Son La  
 VM33 Tay Ninh  
 VM35 Thai Binh

## ECOTOX Aquatic Coding Guidelines

VM34	Thanh Hoa	ZA01	Western
VM74	Thua Thien		
VM37	Tien Giang	<b>ZI ZIMBABWE</b>	
VM75	Tra Vinh	ZI01	Manicaland
VM76	Tuyen Quang	ZI03	Mashonaland Central
VM77	Vinh Long	ZI04	Mashonaland East
VM50	Vinh Phu	ZI05	Mashonaland West
VM78	Yen Bai	ZI06	Matabeleland North
		ZI07	Matabeleland South
<b>* VQ VIRGIN ISLANDS</b>		ZI02	Midlands
		ZI08	Masvingo
<b>WQ WAKE ISLAND</b>			
<b>WF WALLIS AND FUTUNA</b>		<b>TW TAIWAN</b>	
<b>WE WEST BANK</b>		TW01	Fu-chien
		TW02	Kao-hsiung
		TW03	T'ai-pei
		TW04	T'ai-wan
<b>WI WESTERN SAHARA</b>			
<b>WS WESTERN SAMOA</b>			
WS01	A'ana		
WS02	Aiga-i-le-Tai		
WS03	Atua		
WS04	Fa'asaleleaga		
WS05	Gaga'emauga		
WS07	Gagaifomauga		
WS08	Palauli		
WS09	Satupa'itea		
WS10	Tuamasaga		
WS06	Va'a-o-Fonoti		
WS11	Vaisigano		
<b>YM YEMEN</b>			
YM01	Abyan		
YM02	'Adan		
YM07	Al Bayda'		
YM08	Al Hudaydah		
YM09	Al Jawf		
YM03	Al Mahrah		
YM10	Al Mahwit		
YM11	Dhamar		
YM04	Hadramawt		
YM12	Hajjah		
YM13	Ibb		
YM06	Lahij		
YM14	Ma'rib		
YM05	Shabwah		
YM15	Sa'dah		
YM16	San'a'		
YM17	Ta'izz		
<b>CG ZAIRE</b>			
CG01	Bandundu		
CG08	Bas-Zaire		
CG02	Equateur		
CG09	Haut-Zaire		
CG03	Kasai-Occidental		
CG04	Kasai-Oriental		
CG06	Kinshasa		
CG07	Kivu		
CG05	Shaba		
<b>G1ZA ZAMBIA</b>			
ZA02	Central		
ZA08	Copperbelt		
ZA03	Eastern		
ZA04	Luapula		
ZA09	Lusaka		
ZA05	Northern		
ZA06	North-Western		
ZA07	Southern		

**APPENDIX S. APPLICATION TYPE CODES**

Application Method	AQUIRE Code
Aerial (unknown type)	AE
Aerial-granular	AG
Aerial-spray	AS
Direct application	DA
Ground-granular	GG
Ground-spray	GS
(application from a large device, eg., truck tanker)	
Hand-spray	HS
(from a small supply, able to be applied by one person, eg., backpack sprayer)	
<i>In Situ</i>	IS
Multiple	MU
Not Reported	NR
Pump	PU
Soil slurry	SS
Spray (unknown type)	SP